

SPECIAL SECTION: LIVING IN SPACE

FUTURE

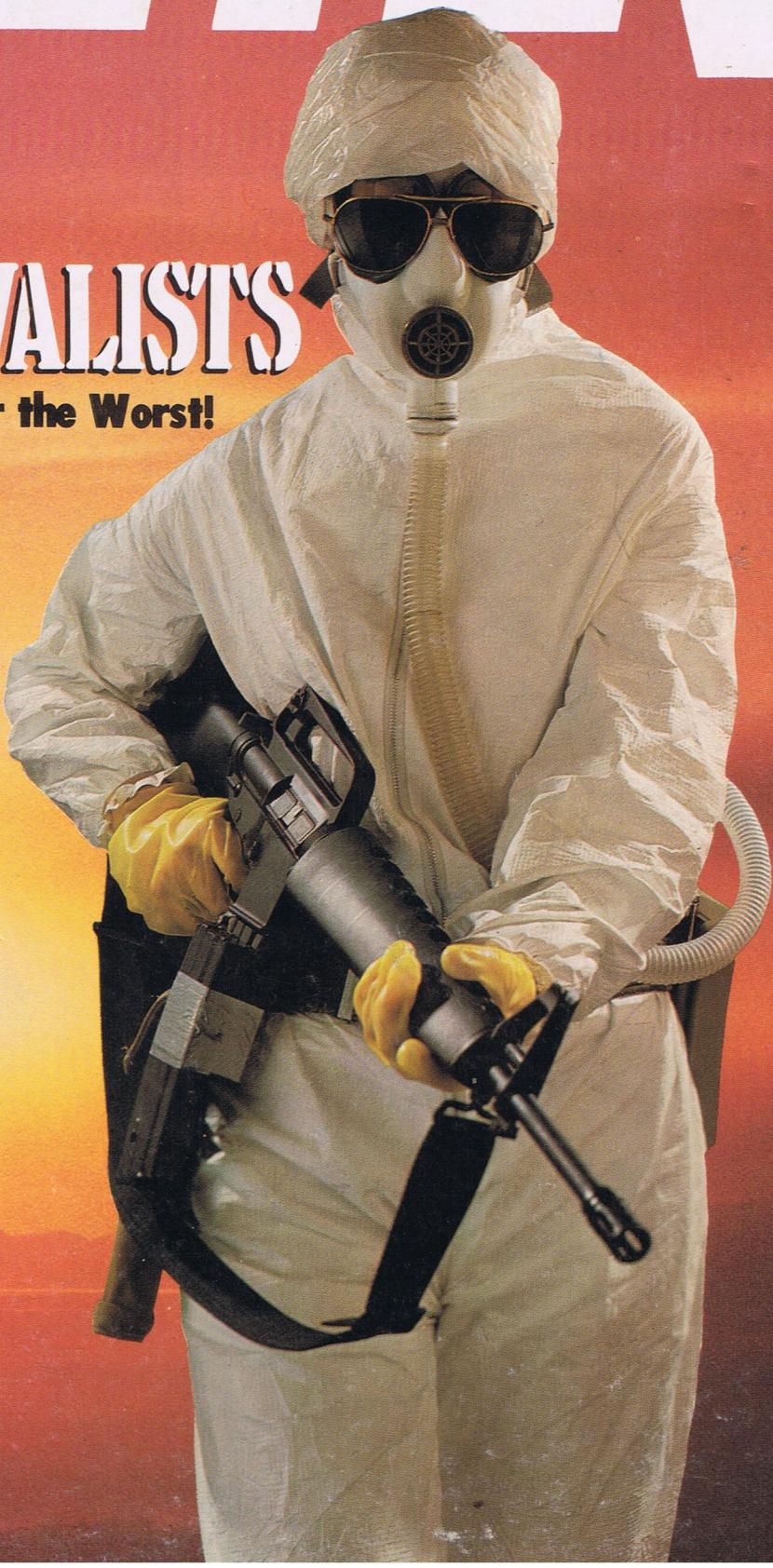
LIFE #27

JUNE 1981

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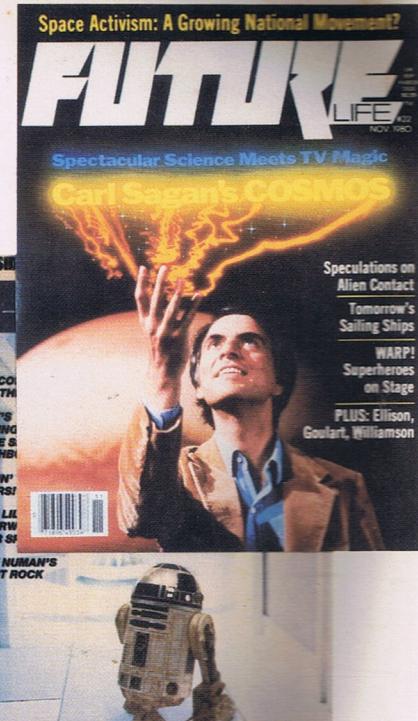
Due to ever-rising production costs, **FUTURE LIFE** is forced to raise its subscription price from \$13.98 to \$14.98 (from \$20 to \$21 for foreign surface mail). But this is still a great savings over the cover price, which will go to \$2.50 per issue. **Subscribe today and save money!**

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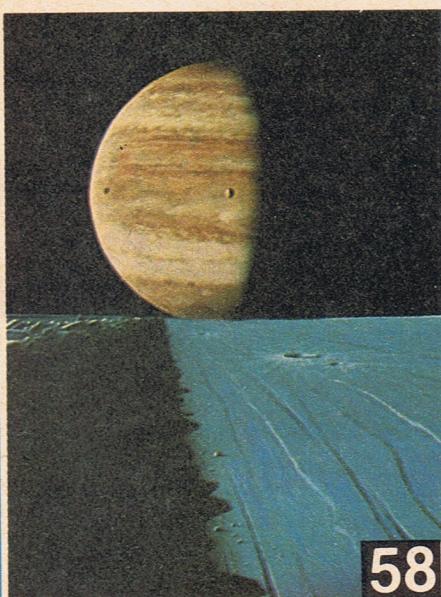
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FUTURE

LIFE

#27 June 1981



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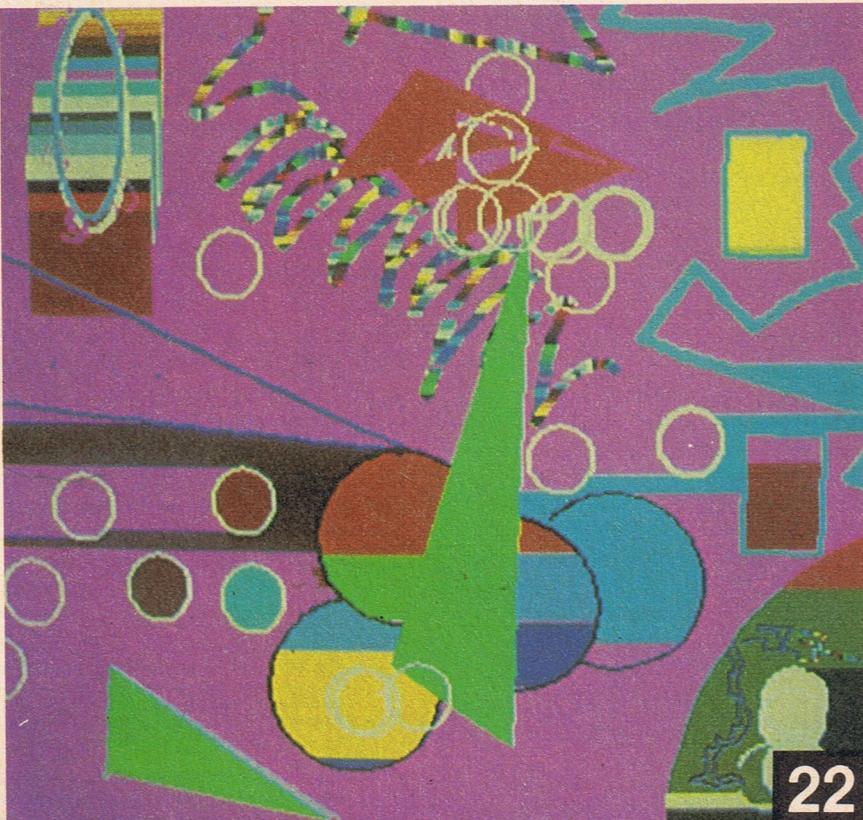
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ON THE COVER: Are you equipped to survive the coming holocaust? Find out about people who are on page 16. Cover: © 1981 Michael Sullivan.

The FUTURE LIFE Philosophy Part II: "Free Enterprise"

Why should a futurist magazine have, as part of its philosophy, an economic position? Aren't business and government relationships as open to debate here as energy alternatives? No—not if human happiness is accepted as the standard for improving the future.

Free Enterprise is a comparatively new idea. Throughout most of history political leaders have assumed control of people's work activities. Governments have recruited citizens to perform tasks the leaders thought necessary (eg. building a pyramid) and they have kept individual businesses at such a small level (eg. via taxation) that an innkeeper or a merchant was lucky to keep his doors open and feed his family—with no chance to blossom out into something big.

The idea that government has no business getting involved in business was, when first voiced about 200 years ago, revolutionary.

A bunch of loud-mouthed radicals (Payne, Adams, Jefferson, among others) actually said that the purpose of government is *to protect the rights of individuals—not to control and restrict their commerce*. They reasoned that a separation of the state and the economy was as necessary in a free country as the separation of the state and the church.

They pointed to historical periods in which economic and religious ideas were government-enforced—the periods of least progress and most suffering. The prime example was the centuries-long shame of human development known appropriately as the Dark Ages, during which religious domination prevented people from *thinking* for themselves and economic domination prevented them from *acting* for themselves.

In spite of opposition to the Free Enterprise theory, it was generally accepted as part of the birth of this country, and what followed was the Industrial Revolution—a century during which the world moved toward the future at a pace never before equalled. The unbelievable scientific and technological breakthroughs of this period were no mere coincidence

Building a business requires difficult long-term effort, the kind of effort that cannot be sustained by government decree—only by personal motivation. Free Enterprise gives individuals that motivation by offering them personal choice in *what they do* and great personal *rewards* for succeeding.

As individuals strive to achieve more and to better their own lives, the entire world enjoys the benefits of goods and services they produce.

Free Enterprise yields two elements that are essential for the future: (1) It allows *unlimited* innovation, development and production within a culture; and (2) It allows individuals the opportunity to pursue their wildest dreams, their highest goals—and therefore to develop a personal sense of efficacy and pride.

Put quite simply, Free Enterprise is a happiness-producing economic system. The fact that happiness is *not equally insured nor guaranteed at all*, does not change the fact that this is the *only* system that allows the maximum.

Nothing about the future is, or ought to be, guaranteed. All we should ask of our government is that it *stand ready* when we need our freedom protected and *stand aside* as we build our careers. Free Enterprise lets us build as lofty and satisfying a life as our imagination, intelligence and energy can create.

Kerry O'Quinn/Publisher

Next issue: "Individual Liberty"

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Because of the large volume of mail we receive, personal replies are impossible. Comments, questions and suggestions are appreciated, however, and those of general interest may be selected for publication in future issues. Write:

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REACHING FOR THE STARS: PRO . . .

After reading and re-reading Kerry O'Quinn's Output in FUTURE LIFE #25, I raise my arm to the stars and salute his uncompromising philosophical view of man's life. Your magazine is on the verge of greatness. Please don't blow it.

Too many editorials in most magazines and newspapers "refuse" to acknowledge the greatness of man's mind and the freedom it requires. To do so, only further destroys liberty and promotes the dread enemy tyranny.

I suggest that in a future issue you attempt to interview the rational mind that most represents your philosophy—Ayn Rand, whose novel *Atlas Shrugged* should be the battle cry for all rational freedom fighters.

And to the readers of FUTURE LIFE: please don't compromise your minds. Freedom, technology and the mind are the inseparable allies in the battle against oppression. Technology is not the enemy—the initiation of aggression is. If you love this precious and too short existence, fight the battle valiantly—nothing feels better.

Robert Schick III
Stroudsburg, PA

Even if we are alone, well at least I don't feel alone, anymore. Through purposeful reasons and good utilization of the media, I have noticed a current stab at all those touchy and quite infectious (seemingly, but not actually), commonly accepted "beliefs." It is encouraging and profoundly reassuring to be able to experience the intellectually expressed opinions of people such as Harlan Ellison, Isaac Asimov, Carl Sagan, Ben Bova and Kerry O'Quinn, to name a few.

For most of my 20 years alive, the power of my intellect was isolated, like so many other unfortunate children and young adults, within the illogical and precarious society from which we come. It took long, but with striving determination, some help from Mother Nature, and a sound, logical mind, I discovered that a cosmic level of reasonable understanding can be achieved.

As important as it may be for Planet Earth to become consciously connected with the universe, space exploration seems primarily inevitable if we, as an advanced form of intelligence are to survive; if we, as the human culture are to evolve towards our cosmic expectations of existing as one with which we (after all) were born.

I find it most comforting to know that there are other people who are not misled by the vast amount of mystical nonsense the human culture has been submerged in ever since the first cave men began to "wonder."

William Boettcher
Cresskill, NJ

... I liked your special anniversary editorial, "Reaching for the Stars," in the March issue. There is indeed no limit to what the human mind can accomplish when it is free to function properly. Achievement, pride, self-reliance and self-respect are for the individual who thinks for himself; anyone who allows others to do his thinking for him can never have these things.

Man will never be able to develop the resources in space as long as he is hampered by government bureaucrats. The bureaucratic mind is not suited for the Space Age, because it is not capable of the adaptability and creativity and initiative required for dealing with new situations. The typical bureaucratic response to anything new that could upset the mediocre but secure "status quo" is to make it illegal! Problems cannot be solved by evading them, and making your problems "illegal" is only a form of evasion.

The Space Age requires free-thinking individualists who can act on their own judgment and initiative. Each person must be willing to accept full responsibility for himself. As long as we allow someone else to be responsible for us as if we were children, we will never be able to develop the emotional and spiritual maturity necessary for survival on Earth or in space.

Ronald Lightfritz
Mannington, WV

. . . AND CON

Let me start by saying that I have been buying FUTURE LIFE since #1, and I have always agreed with your editorials, but your Output column in issue #25 angered me to the extent that I couldn't live with myself unless I wrote to you and expressed my opinion on the subjects that you covered.

First of all, I agree 100 percent that humanity must enter space to reach its full potential. This, however, is where our opinions diverge. While it would be a step in the right direction to allow private companies to run part of commerce in space, the actual activity of space expansion should be the responsibility of the government, and this is the reason:

If private companies are totally in charge, then it is almost certain that only the rich and the powerful would be able to explore the "final frontier," which would exclude me and almost everyone I know. It is my dream to one day travel to the stars, but do you think that Exxon, Honeywell, or any other international conglomerate would consider a person who, like literally millions of other Americans, grew up in a quiet, urban, middle-class, residential area?

My principal argument, however, and the

reason I wrote this letter, is this: Your editorial reads like the Libertarian Party platform. Not that you can't write whatever you like in your own magazine, but I have never agreed with their belief that taxation is stealing. I think it is the responsibility of the government to build roads, handle education and provide food and shelter for those who cannot provide it for themselves.

The roads aren't such a big deal, but the idea of a country with no public education provided by the government genuinely frightens me. I strongly believe that it is the right of every human being to be educated to at least high school level. Without government-supported education, where is this going to come from for people who can't afford \$500 a year to send his/her child to school?

And another thing, that is even more frightening, is the idea of a nation with no social conscience, one that lets people who are unable to pay the rent without giving up food (and vice versa) either starve or live in the street. Perhaps you and your executive friends won't see the pain and suffering of starvation from your orbiting offices, but for millions of lives, it will be all too real. While I strongly support the expansion of mankind into space, the 260 million Americans and four billion Terrans will always come first.

Anthony James Dunlop
St. Paul, MN

... I read your editorial in FUTURE LIFE #25 with some interest (and rather more amusement). Being a Catholic, I suppose I might be expected to respond with heat to your quaint notions about religion, but I won't—they are perfectly understandable in the light of the half-baked and ill-informed opinions you espouse on other subjects.

You call, for example, for an end to "government interference" in our lives. Interesting notion—but who's to provide all the services, from public libraries to mosquito abatement to police and fire services, that the governments now provide? The private sector? Fine; God help us if the police ever reach the level of efficiency, responsiveness to customer need and service now provided by your local telephone company—just another example of how private enterprise is meeting public need.

And then there's that nasty, wholly unwarranted government interference with business, stifling free enterprise and market expansion in a cloud of pettifogging laws and regulations—obviously the act of a cabal of Commies, right? Wrong; in practically every instance government interfered in business because the abuses of business had become a public scandal. Antitrust legislation exists because without it a single giant corporation would dominate each phase of our economy (as it does in some SF novels).

The FDA doesn't exist because of a conspiracy of leftist ecology freaks but be-

cause good old American business, that citadel of right thinking and "personal responsibility," sold poison to consumers for decades. Not just untested products, but honest poison—they sold mixtures of alcohol and opium to quiet teething babies, O'Quinn; they colored peas with copper sulphate and they sold eye makeup that led to blindness, and they gave not one sweet damn for what those products did to their customers. They sold quack nostrums to cure every disease you can think of and a wide range of products which were, if not deadly, at least dangerous; and none of those abuses were stopped until the government "interfered." OSHA and its predecessors came to be not because some limp-wristed Senator got the horrors about industrial accidents, but because business wouldn't pay for safety. (No profit in *that*.) Organized labor and the laws that support it came to be because without them employers would still be sweating labor 12 hours a day, six days a week, for 12 cents an hour. Pension funds and medical plans would still be unheard of, and workers would still be dying of work-related diseases and accidents by the thousands.

Jim F. Griebel
Long Beach, CA

... In the section on "mental slavery," Kerry O'Quinn spends some time (too much, in fact) denouncing "irrationality," ignoring the fact that sense, like beauty, is in the eye of the beholder. As part of his never-ending crusade against that mean old God (no offense, God), he claims that religion is an intellectual weight and that "reason" is infinitely better. Why? Personally, I think that involuntary adoption of *any* belief is bad. That includes science (capital and small S), "rationality," and human perfectability. Does the fact that Forteanism, Catholicism, mysticism and Surrealism seem to suit me best mean that I can't go up in a rocket? Can you prove that I'm wrong and you're right? Just because you believe in something doesn't mean that everyone else has to believe it also; so in the future please can the dogma and stick to reporting.

Chris Gross
South Sterling, PA

... *Wait!* No, I'm not one of the slavering, wide-eyed UFO cultists; I'm not into "UFO-ology" or anything of the kind. But I do have a casual interest in UFO's, and my letter is directed to your Output in FUTURE LIFE #25 ("Reaching for the Stars"). Along with ghosts and gods and astrology, you lump a "belief" in UFO's as being tantamount to irrationality. If you're referring to the majority of UFO reports, I agree. Most sightings can be explained away as hoaxes or honest mis-sightings of common aerial phenomena (air-craft, meteorological balloons, etc.). However, there are few (repeat, *few*) reported sightings that cannot be explained away so easily, visual sightings accompanied either by

radar corroboration (usually by highly professional personnel) or by legitimate photographs (photos devoid of double exposures and/or thrown or suspended objects) or both. These reports are apparently made by sober, sincere individuals who shun the public limelight (unlike rabid UFO-ologists).

The gist of your editorial is forceful and forthright, but there is a danger here, and that danger is of turning rationality into a strait-jacketed dogma all its own. A controversial subject (such as UFO's) should not be dismissed out-of-hand. Rather, it should be examined, and if there is no truth in it, then discarded; however, if there *is* truth, no matter how small, then that truth should be acknowledged. Broadmindedness is, after all, the cornerstone of discovery.

And isn't discovery what life is all about?
Michael Bogue
Ozark, AK

Kerry O'Quinn replies: *People who argue that the government should solve all our earthly problems (the "starving children" arguments) always ignore where the money for all these services comes from and how it is obtained. To fund these "humanitarian" programs, the money-makers, the productive segment of society, are forced to work several days of each week for the sake of the non-productive and subsidized segments of society. They are not asked to do it out of kindness or compassion—they are forced—with weapons and prisons to back up the system. People who are forced to labor for the benefit of others are slaves, and in a free society, there should be no involuntary servitude!*

As to the UFO debate, the key letter is "U"—unidentified. Hopeful romanticism sometimes short-circuits intellectual investigation in matters of this sort, and whatever we gain in speculative thrills, we lose in hard truth.

I am sincerely gratified by the letters we received in response to "Reaching for the Stars." Whether you agreed with my ideas or not, your thinking—your constant open-mindedness—is building a better future for our world.

PRESERVING SCIENCE

... One of the foremost concerns of FUTURE LIFE and its readers has been the preservation of what at times seems an almost forgotten cause: the flight of mankind into tomorrow and into space. The dream is a great one, its preservation a good and noble effort. It seems, however, that it is time that we looked toward the preservation of the basis for that dream. It's time we tried to preserve science itself.

The election of Ronald Reagan was helped in no small degree by the growing influence of hard-line, right-wing, fundamentalist Christian groups such as the so-called "Moral Majority," who represent the trend toward greater conservatism and nostalgia making its

influence felt all across North America. One result of this growth (a particularly apt word) is the growing acceptance of something laughably called "scientific creationism." This is a feeble attempt on the part of fundamentalists to try to use science to discredit the widely accepted fact that all species of life on Earth came about through a process of evolution and natural selection. Unfortunately, while their arguments and facts are woefully inadequate, their numbers are not.

Surely there cannot be even one reader of FUTURE LIFE who supports this position. Evolution is, as Carl Sagan pointed out in his masterfully executed *Cosmos*, a fact, not a theory. Those who do not believe this, even after one hundred years, still are and no doubt always will be with us. As people concerned with science and the future, it is up to us to insure that those who would have a religious myth treated as a viable alternative to scientific fact are gently but firmly put in their place. Free space belongs to law and politics, not to science.

Since those who do not actually support the creationists seem to underestimate their power, it falls to us as fans of both science and space to take the defensive position.

So fight! Write your Congressman, your local newspaper, irrational fundamentalist tracts like *The Plain Truth*, your local blaster of Moral Majority. Show the world that logic and truth have not been overwhelmed in a sea of best-forgotten superstition!

Derek Stevenson
St. Catherines, Ont., Canada

LOBBYING FOR SPACE

... There is a lot of talk these days about the emerging space constituency: citizen's groups such as the National Space Institute and Carl Sagan's Planetary Society are experiencing phenomenal growth on the eve of the first shuttle launch. Yet these groups, while their sheer numbers may be impressive (combined total of almost 30,000 members), have yet to impress their message on those who really count—the Senators and Representatives on Capitol Hill. At the present time there is not one full-time lobbyist on Capitol Hill working for an expanded space program; yet there are two full-time lobbyists working against Solar Power Satellite legislation.

With the Reagan Administration's proposed budget cuts the prospects for an expanded space program once again appear dim. The space constituency must pull itself together to make its voice heard where it really matters—in the White House and on Capitol Hill. Toward this end the Campaign for Space Political Action Committee is gearing up to provide a non-partisan voice for space in Washington.

Founded last spring, the Campaign for Space PAC is dedicated to directly influencing the political process to encourage the renewal of the American space effort. Its goal is to provide the space constituency with a full-

time lobbyist in Washington. But to accomplish this goal the CFS needs to establish a broad base of support. Interested readers should write to: Dr. David Webb, Campaign for Space Political Action Committee, 300 M St. S.W. Suite 500, Washington, D.C. 20024.

Thomas J. Frieling
Bainbridge, GA

GOOD SPIRITS

... In FUTURE LIFE #24 I noticed a couple of your columnists made somewhat derogatory statements about religion. Now I understand that these gentlemen's opinion are their own and not necessarily yours; and this is not one of those enraged letters threatening fire and brimstone. I think it needs to be realized that most major religions are also out to improve the future through spiritual and not necessarily physical means. As soon as science and religion stop facing off against each other and start working together perhaps the future will be better for us all.

William C. Kirby Jr.
Chamblee, GA

A COMMON GOAL

... While all the "futurists" in such places as FUTURE LIFE dispense twaddle on the inevitability of space colonies and immortality, us common folk in River City see a combination of resource shortages, pollution, depression, Cold War and a return to the days of Al Capone. What would you egghead futurists do about the economy? The Russians? Crime in the streets and suites?

Until you answer these questions, your precious space colonies will be in a mighty precarious position. While that "common heritage of mankind" clause in the Moon Treaty might prevent profits and upset the L-5 Society, it might also prevent violence and destruction. If space colonies and such are as successful as you envision, there'll be plenty for everyone soon enough; especially if we're all immortal after 2000 as a recent article in FUTURE LIFE said.

If we put a lot of money and work into it we can consider it money lost or security gained at a far lower price than nuclear armaments. As the richest and most technologically advanced nation, we can make space colonies happen for all mankind, or we can be penny-pinching and pound foolish and invite war.

Sam Hall
San Francisco, CA

A REDISCOVERED DREAM

... I just wanted to say how much I've enjoyed FUTURE LIFE this past year. After having become discouraged about the state of space exploration programs and future studies groups over the past five years or so, I had more or less abandoned some long-standing dreams of ever participating in any meaningful fashion in the opening of our next frontiers. Your magazine, along with some other

information sources, have reawakened the excitement and the commitment I had made to do whatever I could to contribute to this sort of future. As a geologist primarily employed in looking for oil, I've had the opportunity to see both sides of the energy crisis. From both my view and that of my colleagues it is wonderful to see the response which people have made to what was as much a crisis in attitude as in fact. For the time being most of my time is being spent in finding the oil and gas which is left (much more than is popularly believed), in addition to building the foundations for a future-oriented exploration and research organization to be ready for the time when it is necessary to leave the constraints of this planet for our survival. This time is coming, I feel, within the next 20 years or so. The success of the shuttle is critical. All of the recent colonization and utilization proposals depend on there being a reliable, economic means of transportation available. No wonder NASA has staked so very much on its success. Enclosed is my subscription renewal.

Richard B. Hibbard
President, Solar Exploration
& Research Co., Inc.

Abilene, TX

CRYONICS



PHOTO: TRANS TIME, INC.

... In FUTURE LIFE #24, the article "Cryonics Meltdown," numerous organizations are mentioned; i.e. Trans Time, Alcor and the Cryonics Society of South Florida.

Unfortunately, it would be more helpful if you had included their addresses.

Khan Foxx
San Francisco, CA

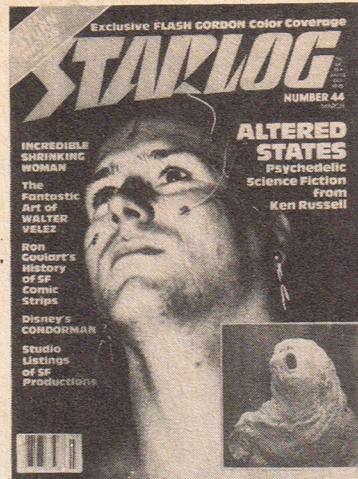
Sorry about that. The address for Trans Time is: 1122 Spruce St., Berkeley, CA 94707; (415) 525-7114. They can give you information about other cryonics organizations.

ANTI-AGING

... The article "The Graying of the Earth" (FUTURE LIFE #25) makes me wonder if the human race would not have been better off without our so-called medical advances. If the enormous drug problems (not just with bad drugs, but people on sleeping pills, Valium, etc.) weren't enough, now we have the prospect of a geriatric race dominating the Earth.

Just as the car (which at the turn of the cen-

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tury was hailed as a solution to the pollution created by the mass use of horses) and the increased use of drugs created new problems, so the prospect of near-immortality will create new social problems that we can only begin to imagine. People should realize that it is the prospect of death that gives value to life and to interfere is to me a crime against nature and a crime against future generations. This Earth should be for the young and not just for the old, and if people didn't die then the young could not be born.

N. Leslie
Palmyra, West Australia

CULTURAL CHAUVINISM

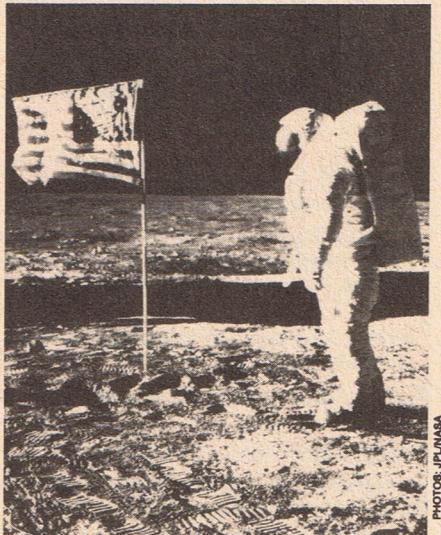


PHOTO: JPL/NASA

... I have been a regular reader of FUTURE LIFE for nearly two years now and I must say that your mag made me discover with pleasure the intense cultural and intellectual activity which is developing in the U.S.A. in relation to science and science fiction. But I also discovered a couple of things which worried me and I felt that I should write you my reflections about it.

The thing struck me when I read In Print in FUTURE LIFE #18. Bob Mecoy wrote: "Science fiction is mostly an American enterprise." And he seems to consider foreign science fiction writers as "exceptions." To me it was astounding. I discovered science fiction through Belgian comics when I was six years old, and I grew up looking at Japanese SF cartoons on TV and reading French comic books (actually, the best SF comic book in the world is French: *Valerian, Agent Spatio-Temporel*). Later, I read American SF books as well as French ones and was familiar with German SF.

Now, reading your magazine, I discover that the Americans (those who write for your mag as well as those who read it) seem to ignore totally whatever is done around the world in SF. As a matter of fact, Americans seem to totally ignore other cultures. Of course, it can be explained: Your country is big and rich, it has a huge market, so who needs imports? You create whatever books,

movies or comics you need. But it also explains a lot of things.

For example, it explains some of the difficulties your country has in foreign policy: You deal with countries you hardly know anything about. Your representation of the world is obsolete and 20 years out-of-date. You can't follow the evolution of peoples you know nothing about, and when they take political positions different from yours, *The New York Times* reacts as if it were treason. In one word, it explains why Reagan was elected.

Do not misunderstand what I am saying: I am not anti-American and I do not wish your country to be defeated everywhere in the world as it was in the last decade. But I hope that, in the next decades, your people will be wise enough to understand that science, technology, progress and freedom are not only the property of America; and that other peoples, other nations, can have a different conception of those things.

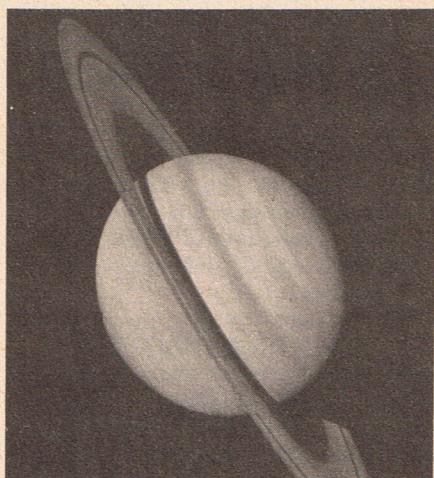
André Pelchat
Victoriaville, P.Q., Canada

CONGRATS

... Just a short note to say that I enjoyed very much your latest article on Epcot Center (FUTURE LIFE #25). In my view, you have captured the basic spirit we are trying to develop, establish and convey through this project.

Martin A. Sklar
Vice President, Creative Development
WED Enterprises
Lake Buena Vista, FL

ELLISON ON SATURN



... Harlan Ellison has said repeatedly that he is not an SF writer and to pigeon-hole him as such is a mistake. To call him even a fiction writer is a grave error. Ellison is a fine writer, period. Ellison's article "Saturn" in FUTURE LIFE #25 is an excellent example of non-fiction elevated to an art. Rather than creating "moments" as in fiction writing, Ellison has romantically and powerfully preserved one of the important historical moments of the century. Not to take anything away from

FUTURE LIFE, the piece does deserve a wider audience.

James J.J. Wilson
Downers Grove, IL

OOPS!

... Not to make a nuisance of myself, but....

I didn't know whether to burst out laughing or tear my hair out when I read through my letter published in FUTURE LIFE #25.

Maybe the mistake was mine, but in any case I'd like to set things straight. The word "malformed," sixth and seventh lines down, should have instead been spelled "malformed." That's what I get for not using "misinformed" instead!

Richard J. Grasso Jr.
Omaha, NE

Sorry for the misintake.

CORRECTION

In our coverage of Voyager I's spectacular encounter with Saturn in issue #25, we accidentally credited the painting on the bottom of page 20 to our space art advisor Ron Miller. Through a filing error, we failed to credit this fine work to its rightful creator, James R. Hervat, an artist/illustrator/photographer residing in Richmond, Kentucky. We regret the error.

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BIOLOGY

KILLER CELLS

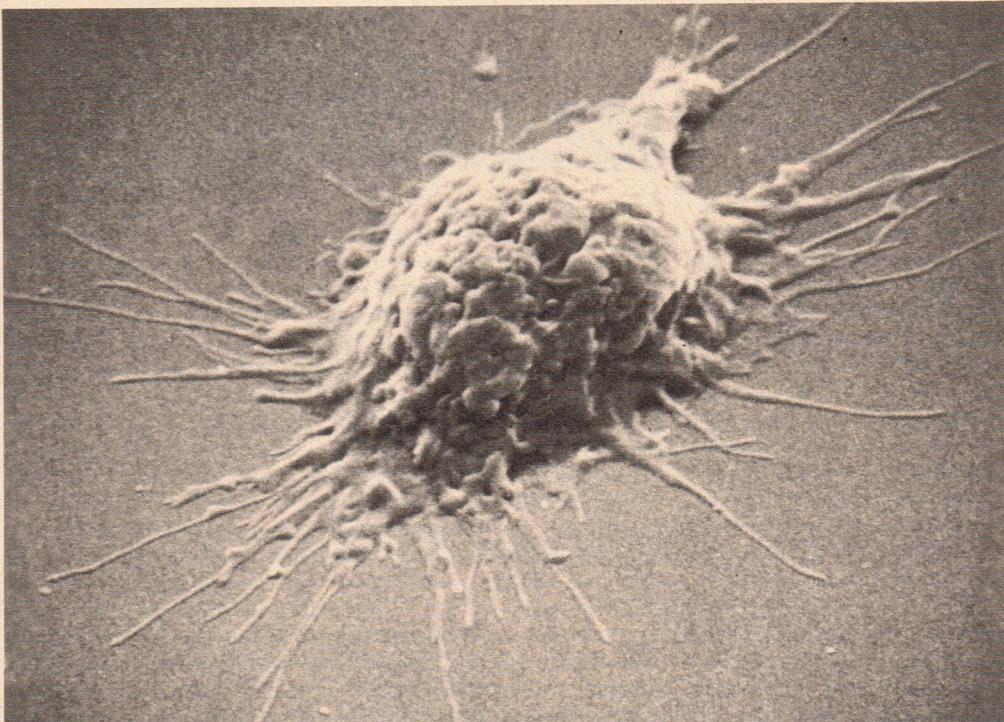
No, these are not stills from a new monster movie . . . although that's not a bad guess, considering what they actually are. They're macrophages, which are mononuclear cells capable of digesting microorganisms. Scientists believe that microphages function as surveillance cells within the human body, closing in on infectious invader cells for the kill.

The photos here are part of a presentation of scanning electron microscope photography at the 17th National Reticuloendothelial Society. The presentation, "Surface Morphology of Cells Involved in Macrophage Mediated Cytolysis," was given by William E. Fleming of The Upjohn Company. This was the first actual look at the mechanism of one of the critical actions of the body's immune system, and was prepared by Fleming, P.S. Satoh, PhD, and John Mathews of Upjohn.

In a step-by-step series of slides, Fleming showed how once the macrophage contacts a target cell, it immediately begins to alter the invader's surface—in this case the invader was a tumor cell. The tumor cell's normally wrinkled skin is first smoothed and then indented, signaling its demise. Destruction of the cell quickly follows.

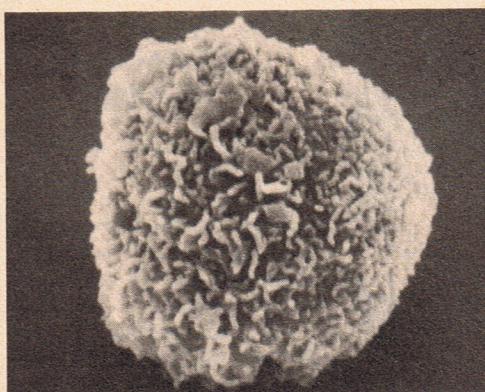
Now, what do you think they can do for the sequel?

—Bob Woods

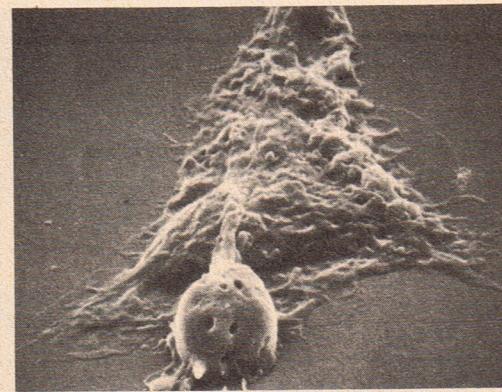


PHOTOS: COURTESY THE UPJOHN CO.

Man-eating microbe? No, a macrophage, that kills infectious cells, seen under an electron microscope.



Cancer cell, target for macrophage.



Holes in target cell membrane.

HEARING AID

HOW'S THAT AGAIN?

It's called "Bioglass," and it's been successfully used to replace hip and thigh bones in humans. Now it looks like Bioglass may be a key material in correcting hearing losses as well.

Bioglass is a ceramic material, invented in the '60s by Larry Hench of the University of

Florida. Unlike other materials used for prosthetic or surgical replacement purposes, it interacts with living tissue and actually bonds with bone.

Currently, it is being tested as a bone replacement for the incus (sometimes called the anvil) bone of the middle ear. The tests utilize mice, which are lucky enough to have the same three-bone arrangement in the middle ear as

humans and, so far, they have been extremely successful. And while Bioglass may not help those of us with an overdose of punk rock and other feedback, if the trend continues, it could correct hearing losses in patients suffering from infection, growths or disease of the middle ear.

Plastics, metals and other materials now in use as bond substitutes are sometimes re-

jected by the body or shift out of position, and some patients actually suffer chronic infections because of the implants.

Bioglass, so far, passes the test in all these areas, and its key feature of bonding with bone could make it extremely useful in other types of operations as well. Which could be good news if your stereo is loud enough to jar teeth loose. —Philip L. Harrison

NOW HEAR THIS

ALTERED SOUNDS

Most people, while listening to, say, a string quartet, can find a great deal in their environment to distract them: a faulty lightbulb, a rustling program, that attractive usher down the aisle.... However, what would that same concerto sound like in an isolated, totally dark space?

Stan Shaff and Douglas McEachern, two innovative California artists, have taken that idea and transformed it into their own theater of sound: Audium. In this unique, specially designed environment, audiences sit in total darkness, surrounded by 360 speakers and listen as a compendium of sounds, both natural and electronic, come at them from above, below and all sides. "I guess a way of describing it to the average concert-goer," explains composer Shaff, "would be as if, instead of going to a concert and having the work performed *at* you, the audience literally walked into the center of the work."

Shaff and McEachern began to develop their new concept of sound as total entertainment about 20 years ago. "It occurred to me a number of years ago," recalls Shaff, "that there was a

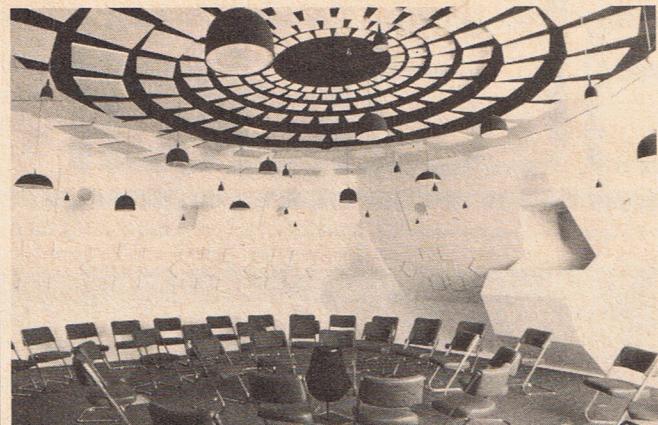


PHOTO COURTESY AUDIUM

Audium is a unique, specially designed hearing environment.

whole new language that had to do with sound as it appears from different points in space. And with the advent of electronics, Douglas was able to build appropriate equipment so that, using many multiple speakers, we were able to direct the sounds from various points in space. We started with a very limited number of speakers and a very minimal console that Douglas built. We eventually discovered that there was indeed a whole new language here.

"In the course of evolving this technology, and my particular compositional technique, it became more apparent that we needed a special kind of environ-

ment to construct and to explore this space and movement." Eventually, with the help of the National Endowment for the Arts, Shaff and McEachern were able to build their own theater: Audium.

In a typical performance, the patrons are shown through a dimly lit maze into a carpeted, dome-shaped auditorium. The lights go out, and sounds begin to dance electronically around the room at a variety of speeds, locations and volumes. Visitors have reported a wide range of reactions to Audium, from distaste to disorientation (the lack of light and the apparent motion of the sounds can create an illusion of

physical movement) to exhilaration. "The audience goes through many different experiences," Shaff explains. "First of all, for people who are unfamiliar with the contemporary ideas in so-called electronic music, it might be somewhat disconcerting because it is not a conventional musical, which most people enjoy in terms of rhythm and melodic lines. It's more of a sound painting, and in fact the audience experiences sound in a much more abstract form.

"I use a lot of natural and some synthesized sounds. The motion, movement, the setting in which they listen—which is an entirely dark space—it evokes a lot of very personal feelings in people. They have a feeling of taking a trip into the past, their own memories. I enjoy that kind of quality in my work—where the altered sounds create an environment.

"In effect, the sound appears to be very fluid and almost architectural. It's almost as if people can reach out and touch it."

Audium is located at 1616 Bush St., San Francisco, CA 94109; phone (415) 771-1616. Performances are Fridays and Saturdays at 8:30 p.m., and no latecomers are admitted. Admission is \$4.00.

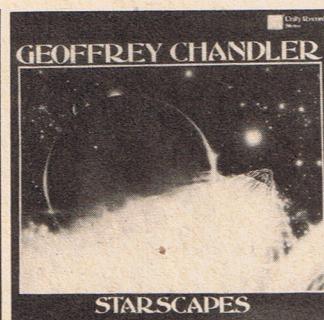
—Barbara Krasnoff

MUSIC

STARSCAPES

Some of our readers may recall artist Geoffrey Chandler, whose fantastic space scenes decorated the pages of FUTURE LIFE #12. Well, Geoffrey is a talented musician as well as an artist, and his first record has recently been released by Unity Records, a small company based in California.

The album, entitled *StarScapes*, features six separate tracks, each a blend of electronic sounds that makes for easy background/meditation music. According to Unity Records, "His music moves the listener into new dimensions of feeling and experience, not with the aggressiveness heard in so much of today's music, but with a gentle, organic sensuality." The themes of these songs, if there can be said to be any specific themes, vary in mood from "Celestial Divine,"



in which a heart seems to beat under the waves of music, to "Polaris," which has an eerie quality reminiscent of the background accompaniment to dozens of old horror films.

The record jacket lists Chandler as composer, performer, producer, engineer and cover artist, and he has filled all these roles ably. *StarScapes* is priced at \$8.98 (plus \$1.00 shipping and handling), and can be obtained through Unity Records, Box 12, Corte Madera, CA 94925.

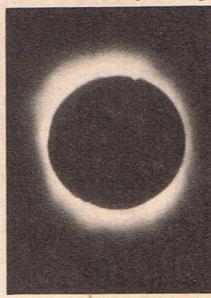
—Barbara Krasnoff

IN THE DARK

CRUISING AROUND

If sitting on the deck of an ocean liner staring up into total darkness turns you on, then you may want to take advantage of an expedition called "Voyage to Darkness," leaving from Hong Kong this summer.

The cruise ship *Coral Princess* will take all interested viewers, plus a supply of the appropriate scientific and technological tools, to a point about 1,200 miles off the coast of Japan to observe a



total solar eclipse which is due to occur on July 31. By maneuvering to avoid overcast skies as much as possible, the *Coral Princess* will try to give its passengers the best possible view of the celestial phenomenon. Along with onboard equipment, enough deck space will be available for those who want to use their own photographic setups.

For more information about the "Voyage to Darkness," write Orient Eclipse Cruise, 1080 Fifth Ave., New York, NY 10028.

—Becky Sharp

FILM

TOYING WITH TIME

The winner of the "Most Confusing Film of the Year" award will almost certainly be *Time Bandits*, a comedy being produced and directed by Terry Gilliam of Monty Python fame. According to a public relations release, the storyline concerns a band of greedy dwarves—Randall, Fidgit, Wally, Og, Strutter and Vermin—who, along with schoolboy Kevin, race through time with a valuable blueprint "robbing and being robbed by some very famous and expensive movie stars." These stars include John Cleese, Sean Connery, Shelley Duvall, Michael Palin, David Warner and Sir Ralph Richardson as the Supreme Being. *Star Wars* fans may also want to look for (although they will probably not recognize) Kenny Baker, who is also the man under



A publicity illustration for *Time Bandits*, an extremely weird new motion picture.

the metal shell of R2D2. Executive producers are Denis O'Brien and George Harrison (ever heard of him?); the latter has also provided the music for the epic.

—Barbara Krasnoff

SOLAR SYSTEM

PLUTO-MANIA

Ever since Pluto's orbit crossed that of Neptune's in 1979, astronomers have been focusing their big "eyes" on the planet as never before...and with interesting results.

Pluto's moon, Charon, was discovered just prior to the orbital crossover. Now astronomers at the University of Arizona have discovered that the ninth planet has a substantial methane atmosphere as well.

Why wasn't it discovered sooner? It's possible, according to the astronomers, that the planet's unusual orbit may affect the atmosphere, that it exists only when Pluto is closest to the sun and then freezes out into a surface methane frost during the remainder of its 248-year "year."

The discoveries surrounding Pluto don't stop there, however,

for other astronomers at the U.S. Naval Observatory in Washington have detected irregularities in the planet's orbit that could mean the existence of what has almost become an astronomical myth...a tenth planet. According to the calculations of Dr. Thomas Van Flandern, this tenth planet is about four times the size of Pluto and located about one and a half times farther away.

The upcoming new search for No. 10 will doubtless bring back many memories associated with Pluto's discovery, which was originally based on calculations surrounding irregularities in the orbits of Uranus and Neptune. The search for Pluto was started in 1906 and its discovery made 24 years later. With today's sophisticated equipment, No. 10 will hopefully be discovered a few years sooner.

Anybody want to take bets on what it will be named?

—Philip L. Harrison

MORE ON OZONE

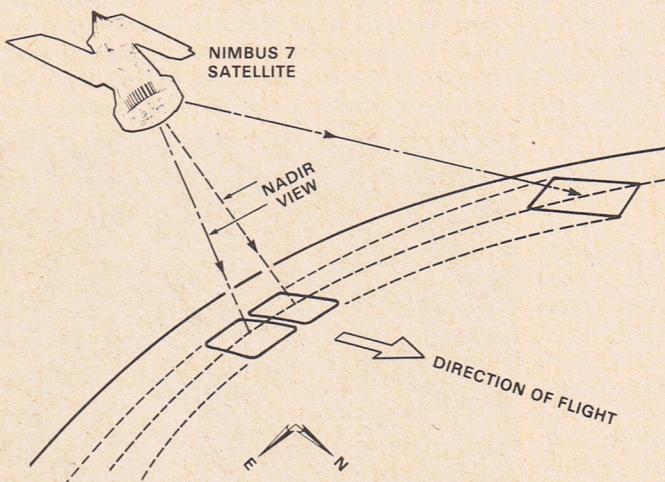
GAS PAINS

There you sit aboard the Concorde, cruising at 55,000 feet, settling back to watch the latest *Airport* sequel. All of a sudden you feel a strange irritation in your throat. Your eyes begin to sting. Your sinuses start to burn.

Diagnosis: You are suffering from the effects of high ozone concentration. That's right, our old friend ozone, the atmospheric gas whose depletion by fluorocarbons is mucking up terrestrial protection from the sun's ultraviolet rays. Only this time the ozone problem is airborne. But before you cancel your flight reservations, take a look at what NASA, the Federation Aviation Administration and Northwest Airlines are doing to alleviate these atmospheric gas pains.

Because of growing complaints about ozone-related symptoms, the FAA recently passed down a regulation requiring airlines to limit the ozone levels inside all aircraft. Therefore, a two-month experiment was begun on March 2 that will coordinate information from NASA's Nimbus 7 satellite, the FAA and Northwest Airlines. If successful, the results

OZONE MAPPING WITH NIMBUS 7 TOMS



The Nimbus 7 satellite will help airlines locate areas of high-ozone concentration.

could be used to avoid areas of high-ozone concentrations and to save time and fuel on transcontinental and international flights.

Airlines now calculate ozone concentrations by using statistical predictions, but these are not necessarily accurate since they do not give real-time data, a problem the Nimbus can hopefully eliminate. When the satellite was launched in 1978, it was equipped to monitor Earth's manmade and natural pollutants—including ozone. At the time, there was

great concern about fluorocarbons, the chemicals found in aerosol cans and some refrigerants that are being blamed for the erosion of Earth's ozone layer.

Early computer-enhanced pictures from Nimbus 7, taken by the satellite's Total Ozone Spectrometer, pinpointed distinct patterns in the stratospheric ozone concentration. The pictures also offered information that could be used to commercial advantage. There is a high correspondence between the ozone concentra-

tions and high and low stratospheric pressure areas that establish the flow of the jet streams. Jet streams work like water currents; if you get into one as a tailwind, the aircraft's speeds can be increased, thereby decreasing flying time and fuel consumption. Researchers also assert that the spectrometer information can be used to determine areas of high air turbulence, the cause of bumpy rides and the plane's controllability.

—Bob Woods

IN SEARCH OF...

FLASHY FISH

Scientists at the Scripps Institution of Oceanography are trying to find out why 80 percent of all ocean species exhibit a phenomenon known as bioluminescence. Bioluminescence is the ability of an animal to produce its own light, as in the case of fireflies and jellyfish. Though the property is quite prevalent among ocean species, little is known about its effect on the marine environment as a whole.

The Scripps study will center around the deployment of light-sensitive instruments suspended from an anchored buoy floating about 50 feet underwater. The buoy, held stationary by three cables tied to weights on the ocean floor, is located approximately one half mile offshore from Scripps' base at the University of California's San Diego campus in La Jolla.

According to Dr. Jon A. Warner, research biologist at Scripps and associate investigator of the project, there are virtually no instruments available to measure long-term features of bioluminescence. The buoy rig will provide, for the first time, round-the-clock

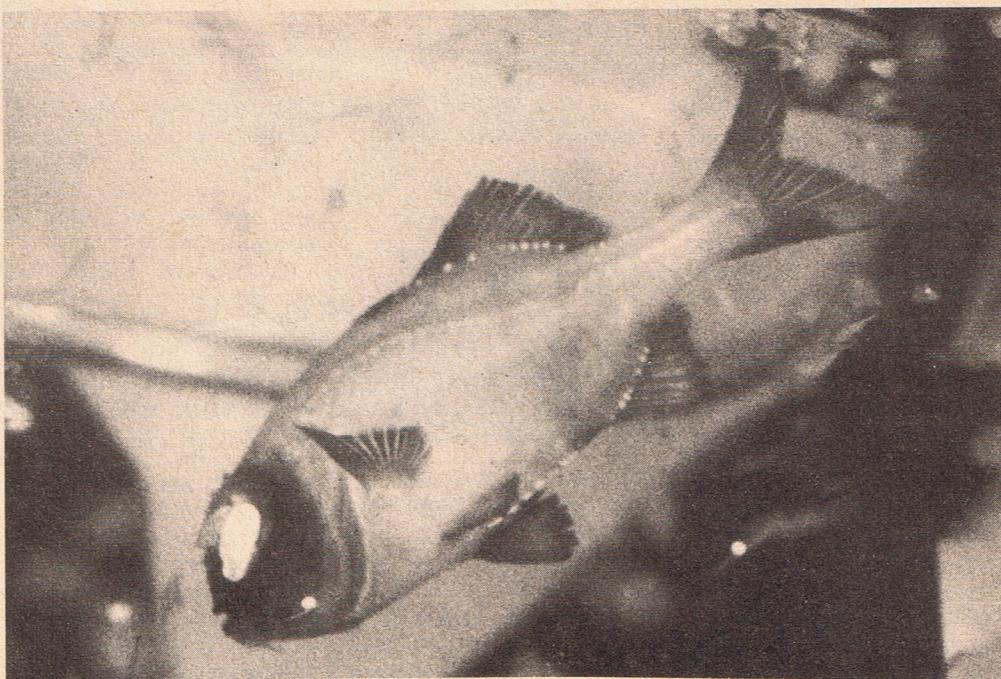


PHOTO BY PHOTO

This "flashlight" fish has bioluminescent light organs located under each eye.

data not possible from any other sources. Specifically, a photometer, similar to instruments used by astronomers to measure starlight, will be used to record individual underwater flashes—called bioluminescent signatures—made by the organisms. A computer system at Scripps will

store and analyze the signatures. Warner states that marine biologists speculate that there must be dozens of ways that species use their bioluminescence: attracting mates or prey; defending territories; avoiding predators; communicating among other species. In studying other animals which

light up, researchers have found some biomedical applications. For instance, the chemicals from fireflies are used to measure oxygen, adenosine triphosphate and enzymes in human cells, and chemicals from jellyfish are used to analyze cells' calcium level.

—Bob Woods

CONFERENCE

THE CASE FOR MARS

With the Voyager flybys and the space shuttle lift-off still fresh in the public's memory, space interest groups will be taking advantage of the times to offer a variety of workshops on our solar system.

One of the first of these will concern a near neighbor. "The Case for Mars," a workshop to be held April 29-May 2 at the University of Colorado, will address the development of the case for a manned mission to Mars. Co-sponsored by the Viking Fund, the National Space Institute and the University of Colorado Space Interest Group, the weekend will include the presentation of selected papers on various topics pertaining to sending humanity to Mars.

For further information on the event, which has a registration fee of \$45 (\$20 for students), write the Case for Mars Conference, PO Box 4877, Boulder, CO 80306.

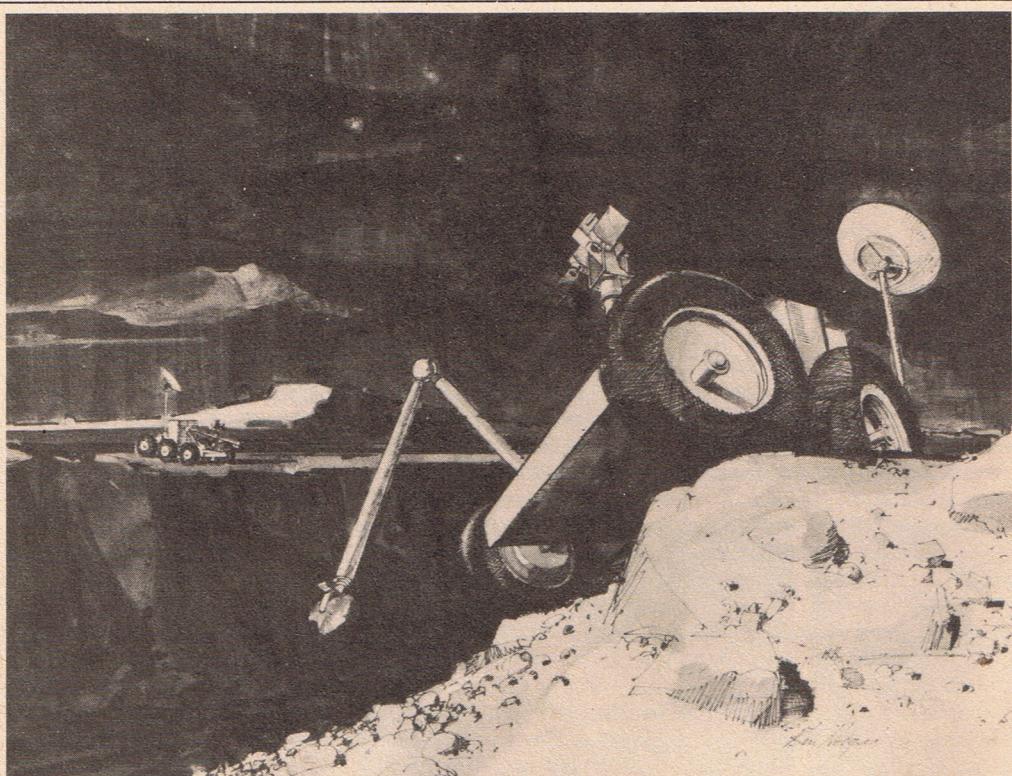


PHOTO: JPL/NASA

The Mars Rover will help scientists study Martian geology and search for new life.

SPACE SALVAGE

METEORITE MINING

A futuristic NASA report of 1977 has suggested fabricating glider-like lifting body vehicles to carry bulky cargoes of metal (space-processed ore derived from Moon and asteroid belt mining) to Earth, where these unmanned atmospheric reentry vehicle/containers would then be retrieved from their ocean-landing zones and towed to ports for salvage and use by Earth's inhabitants.

FUTURE LIFE (#9) readers may recall that Dr. Jesco von Puttkamer, in his discussion of potential terraforming methods, opted for a transformation technique for an unpeopled planet, Venus, entailing large-scale planetary bombardment by huge ice asteroids.

Geographos, a Los Angeles-based geographical consultancy, believes that future terraformers should consider the ballistic uses of titanium-coated, massively shaped chunks of extraterrestrially mined metal. These vehicle/containers would resemble ICBM nosecones and such man-made, directable "meteorites," used as rapid excavation strip-miners, could be accurately impacted at such remote and sparsely settled

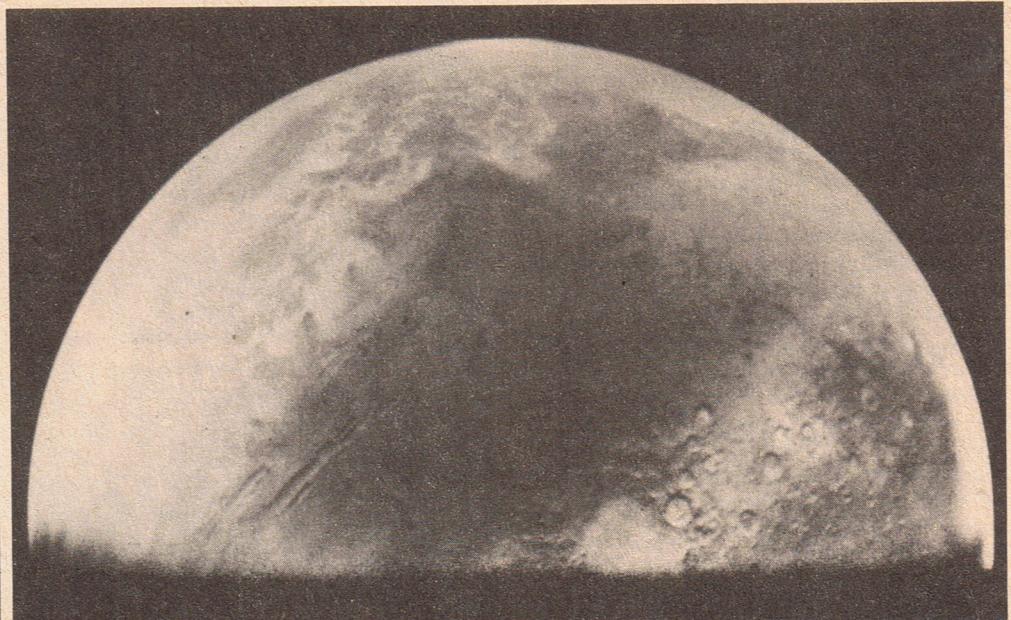


PHOTO: JPL/NASA

Future mining for valuable ores may be conducted on the moons of other planets.

places as the Sahara or Central Australia. By violent impacts of such high-speed vehicle/containers, several benefits would accrue: the artificial "meteorite" would deliver its cargo of cheaply mined ores from outer space to isolated land areas of Earth; the duration of the strip-mining process locally would be comparatively short; and, consequently, the ecological recovery period would be lengthy. Further, Geo-

graphos believes that vast resources of freshwater lie close to the surface beneath the North African desert; thus, an irrigation water supply could be uncovered for subsequent (post-impact) use by trained agriculturists. Nomadic peoples of the Sahara, for example, could be given instruction in modern farming procedures, while Directed Meteorite Excavators (DME) would be impacting specific land regions.

America's Peaceful Nuclear Explosions (PNE) program during the 1960s having been plow-shared into economic infeasibility by 1970, would DME technology prove to be a viable substitute? Geographos believes this idea is a way for isolated peoples on marginal land to develop settled agriculture and to industrialize their economy (based, perhaps, on solar energy systems).

—Richard Brook Cathcart

AUDIO TECHNOLOGY

LISTEN WHILE YOU REST

The manufacturers of home entertainment products have long proceeded on the assumption that Americans will rush to buy anything that will prevent them from having to vacate their easy chairs. For example, the television industry first came up with the remote control channel

changer; then they put first-run movies on cable stations; now they have made it possible to even answer the phone through that same TV set!

Well, never ones to be behind the times, stereo manufacturers have now come up with their own toy for lazy listeners: a turntable that changes the record itself.

Billed as "an electronic breakthrough that could revolutionize the home audio industry," the

Sharp Electronics Corporation's new VZ-3000 consists of a microprocessor-controlled, vertically mounted linear tracking turntable capable of playing both sides of a record via two tonearms; an AM/FM stereo tuner; a metal-capable cassette deck and matching two-way speakers. The machine automatically detects the size and speed of the record, places a tonearm in the proper position and begins to

play. It can be programmed for continuous play of both sides (one at a time, of course), random play of either side, or endless repeat of one or both sides. One simply places a record vertically in the turntable, closes the cover and heads back for that easy chair.

The VZ-3000, which has not yet been priced, will be available in August.

—Barbara Krasnow



PHOTO: SHARP ELECTRONICS CORP.

Sharp's new stereo will save consumers from the arduous task of changing the record.

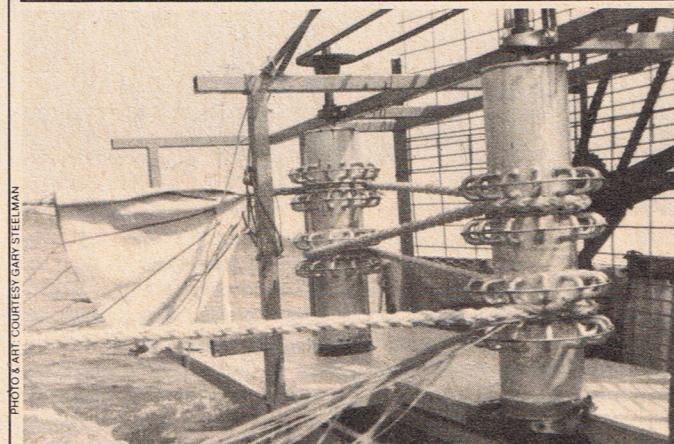
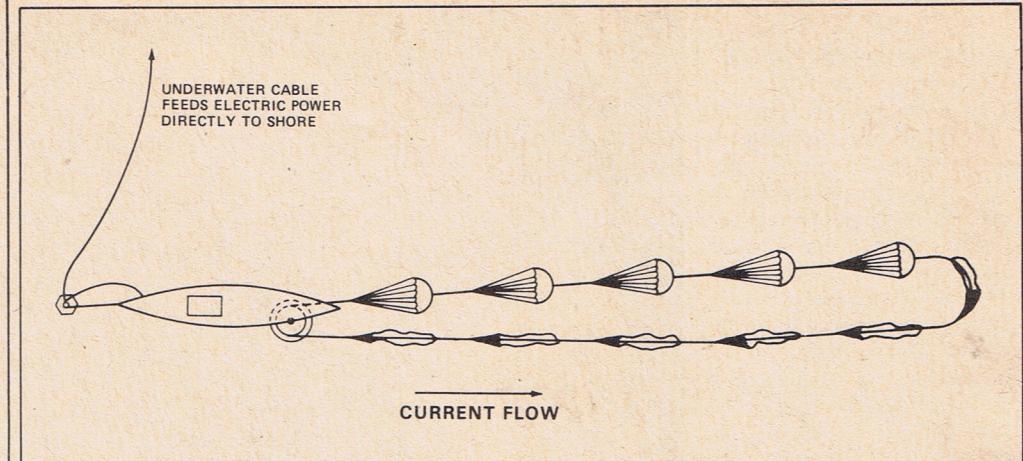
OCEAN ENERGY

PARACHUTE POWER

Iowa may be a landlocked state, but at least one of its residents has his mind fixed on far-away ocean currents. Gary Steelman, a self-described inventor from Adel, Iowa, has come up with an energy-producing system employing fast-moving ocean currents, like those found in the Gulf Stream. Steelman and a partner, Richard Turner, have formed a company to market the Water Low-Velocity Energy Convertor or WLVEC.

Steelman's device works much the same as a hydroelectric system, but without a waterfall. The WLVEC consists of two main parts: wheels mounted on an anchored barge, and a continuous loop of cables and parachutes that form a conveyor-belt type of system. It all works something like this: The parachutes expand as they face the current and collapse as they come around the loop and away from the flow of the current. The open parachutes fix the loop, which is wrapped around wheels. The loop turns the wheels, the wheels drive a generator, the generator produces electricity. Sounds pretty simple, doesn't it? Well, it really is, according to tests conducted in Florida, and in Saylorville Lake near Des Moines.

After receiving government funds to test his device, Steelman was granted a patent in 1975 and successfully tested a small WLVEC in the ocean off Cape Canaveral in '76. The test was so promising that the Department of



Top: The WLVEC is a series of expanding and collapsing parachutes and cable wrapped around generator wheels (below).

Energy, through the Solar Energy Research Institute, contracted Steelman to make a larger model. With a mere \$35,000 in combined funds, the 40-year-old inventor put together the new prototype and conducted experiments at Saylorville Lake.

The tests were flawless, proving that the machine can produce economical electricity. The inex-

pensive materials used for the ropes and parachutes—synthetics such as nylon and Kevlar—plus the limitless source—ocean currents—end up generating power for approximately \$25 per kilowatt capital investment, making this the cheapest of any ocean-energy system.

Professor Delmar Van Meter, a mechanical engineer at Iowa

State University who is working on the project's technical reports, is especially enthusiastic about WLVECs. Van Meter calculates that with a series of 40 parachutes, each 300 feet in diameter, attached to a loop at intervals of 1,500 feet, stretching 5.7 miles in the Gulf Stream's three-knot current, 35 megawatts of electricity would be generated (Iowa Power's average power output is about 500 megawatts). According to this formula, several Steelman loops could generate half the electrical needs of Florida.

"The mind boggles at the implications of these figures," says Steelman. "These loops can be used in ocean currents throughout the world. Unlike coal and oil, moving ocean water is a virtually free and unlimited source of power. This 'oil well' will never run dry and will never be shut off by an oil cartel. And, better still, there is absolutely no pollution or toxic waste to store."

—Godfrey Andolph

NEW EVOLUTION THEORY

IN THE BEGINNING

NASA scientist Dr. David White has come up with a new theory about the chemical evolution of life. According to White, life emanated from simple self-replicating chemical systems rather than complex ones more than 3.5 million years ago.

The common theory of chemical evolution holds that natural energy—lightning, sunlight and heat—combined with air, soil and water during primordial times. Continuous interaction and evolution of the chemicals over the millennia

eventually resulted in combinations that could reproduce themselves, and finally produce the first living cells.

White states that very simple self-replicating systems could have appeared very early in chemical evolution. Experiments conducted at NASA's Ames Research Center in Mountain View, Calif. and the University of Santa Clara support the hunch. Researchers there showed that under simulated conditions a short chain of amino acids can produce longer chains of another amino acid and still longer chains of a catalyst molecule—an ability essential for life. It was this

catalyst, called a "proto-enzyme catalyst," that was suggested in White's work.

However, experts agree that the discovery of the catalyst molecule is not in itself enough for the origin of a self-reproducing molecular system, which requires nucleic acids as well as molecules to pass along genetic codes. Nonetheless, computer modeling has suggested the theory of the simple system described by White. And this is all assuming that molecules from which to build amino acid and nucleic acids were already present on primordial Earth, an idea that has gained much empirical sup-

port lately.

Further experiments are being planned, using the most commonly found biological building blocks to look for other simple catalysts and for nucleic acid patterns. The hope is that they will find out whether self-reproducing molecules can organize themselves in the laboratory.

White, an assistant professor at the University of Santa Clara and research associate in the Extraterrestrial Research Division at Ames, published his new theory in the *Journal of Molecular Evolution*.

—Bob Woods

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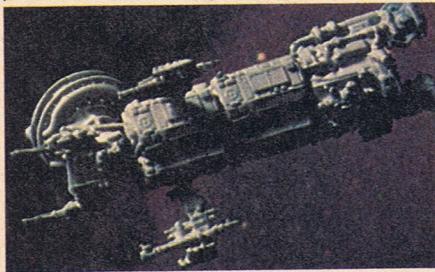
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SURVIVALISTS

They're Americans preparing for the worst—nuclear holocaust, economic collapse, race riots. They're taking to the hills, but are their fears unwarranted?

By SUZANNE WEYN

...ashes, ashes, we all fall down.

One of my most vivid childhood memories is of being huddled under my desk during air-raid drills. There I knelt, hands dutifully held over my head, eyes shut tight to protect them from flying shards of bomb-struck glass. As I rapidly mumbled with the rest of my class the rosary that the nuns were leading us in (civil defense with a Catholic touch — all bases covered), I remember thinking, even then, that it was all rather ridiculous. Any bombs that were going to land on my grammar school were not going to be stopped by my desk. However, in those days I still believed in miracles.

Since that time, more than 20 years ago, the temper of the times has come almost full circle. The Cuban Missile Crisis was, of course, averted. The bomb shelters of the 1950s were all but forgot-

ten and those who clung to their private defense shelters were caricatured as kooks. Recently, however, America is seeing a resurgence in home defense planning. An ever-increasing number of people (an estimated one million, at present) are storing gold, guns, food and supplies in preparation for disaster.

These people have been grouped together and dubbed "Survivalists" by the media, yet the only thing they may have in common is a shared conviction that things are going wrong in America and that it is necessary to fortify against some coming danger. In some cases they may share a network of communication via newsletters, books and training programs; but for the most part, Survivalists encompass a broad range of American society. The fears that motivate them run the gamut from nuclear war through fear of economic collapse, racial uprising, environmental disruption,

What the Well-dressed Survivalist Is Wearing This Year





ART: COURTESY PALADIN PRESS

Solid black areas represent primary targets; open circles represent secondary targets.

governmental control and religious apocalyptic literature. Their reasons diverge and overlap, but they all believe, as survival economist Howard Ruff put it, "It wasn't raining when Noah built the ark."

Bruce Clayton is a biologist who became interested in Survivalism while getting his doctorate at the University of Montana. As an environmentalist he was concerned about the issue of nuclear power and wanted to know what the anti-nuclear people had to say. The more Clayton listened, the more alarmed he grew—not by the threat of nuclear power, but by what he considered gross misrepresentations of the facts by anti-nuclear factions to the American people. This led Clayton to do his own research and to come up with the conviction that most Americans can and will (despite themselves) survive a nuclear attack.

"The people who are trying to scare you are usually disarmament people," says Clayton, who has recently published a sort of everything-you'll-ever-need-

to-know book on Survivalism called *Life After Doomsday*. "That group of doctors up in Boston are the best example [Physicians for Social Responsibility]. They have an axe to grind and they're trying to scare everybody. Civil defense people do it because they need a bigger budget. Pentagon people do it because they want bigger budgets. Soviets do it because they want us to disarm. People who write films and science fiction can do it because nobody wants to watch a movie about how easy it is to live through a nuclear war.

"If you go to the scientific literature you'll find that those guys are exaggerating to an extent that is really irresponsible. They pick up each other's exaggerations and then re-exaggerate them and eventually you get to a point where everybody in the Northern Hemisphere is dead. I'll give you an example: A few years ago, the National Academy of Sciences came out with a report [*"Long-term Worldwide Effects of Multiple Nu-*

clear Weapons Detonations," 1975] and the anti-nuclear people cited it as proof that we're all going to die in the event of a nuclear war. The report didn't say anything of the kind!"

Dr. Clayton feels that the belief we're all going to vaporize instantly in the event of a nuclear explosion is "a hollow promise" and one that will cause untold misery to those who find themselves unhappily still alive and unprepared after an atomic attack. "People who say, 'I hope the first bomb falls on me,' are really voicing a rather strange suicidal sentiment," he feels. "The problem is the illusion that people are snuffed out, that one second you're there and then next, nothingness. If the bomb goes off, the blast may very well kill you instantly if it picks you up and knocks you off the side of a building, but what people usually say is that 'the bomb will just vaporize me.' Nobody got vaporized in Hiroshima—it doesn't happen that way. What you get is an extremely severe burn

over the side of your body that is facing the fireball, depending on how close you are." Speaking of the victims at Hiroshima, Clayton describes, "They were blinded and in terrific pain, but they were conscious and rational and alive. This illusion that you get turned off like a light bulb just doesn't hold water. They died within the first day, they were direct bomb victims, but I can think of a lot of ways I'd rather die."

For those who survive the bomb (the majority) Clayton foresees radiation sickness, rioting and mass starvation. In *Life After Doomsday*, Clayton gives advice on how to avoid all that and avoid it pretty comfortably. Maps, charts and a lively text give advice on where to go, how to get there, what to bring, etc. His book is written with a full acknowledgement that people are Survivalists for many reasons, other than fear of nuclear attack, and that people need, therefore, a variety of alternatives.

Clayton explains the different types of Survivalists as: those who are prepared to survive in the vicinity of urban areas; those who have U-hauls or campers stocked and ready to go; those who have a prepared refuge out in the woods, though they live in the city; those who move out into the country and build a virtual fortress around themselves; and the ones that Clayton himself favors most, those who move to self-supporting communities that are small enough to sustain themselves in time of crisis.

John and Alice Fisher are firmly convinced that Clayton's last alternative, moving to a small town, is the best solution. They have sold their home and business and bought a 91-acre farm in the Ozarks which they selected for its temperate climate, distance from nuclear targets, distance from population centers and distance from earthquake zones. It didn't hurt that the real estate agent mentioned, "In this particular area, we could close off civilization at four different road points with just a handful of families." The Fishers plan to grow their own food, use the cedar grove on their land as a source of income and hopefully become 80 to 90 percent self-sufficient.

The Fisher's primary worry is not nuclear war. They, like a great many other Survivalists, are more concerned that there will be a total breakdown in the American economic system, which will bring in its wake material shortages and massive social upheaval.

"I began studying the stock market and it appeared that everything got back to gold," John Fisher remembers. "I had an opportunity about seven years

ago to get into gold refining and from there it was easy to get into Survivalism." A catalyst for the Fishers in making the connection between economic concern and Survivalism was Howard Ruff.

A former stock broker, Ruff came into public attention last year with his book, *How to Prosper During the Coming Bad Years*, which stayed on the best-seller list for 46 weeks. Ruff also has a syndicated weekly television show and a newsletter that is distributed to thousands of families at \$145 a year. (Estimates of how many subscribe to the newsletter, *Ruff Times*, varies from 125,000 to 200,000.)

"Getting into [Survivalism] through the financial end came through Howard Ruff," John Fisher explains. "He advises that you can't eat gold and you can't eat silver so you might as well do something for food, and he sees problems in the economic system that are going to break down the distribution of food.

"For example, the truckers might decide that they're not getting a fair share and decide to go on strike. If that happens, there are going to be a lot of hungry people possibly only for a short period of time, but I like to eat."

Alice Fisher points out that Howard Ruff is not all talk and theory. The Ruff Times Group, to which the Fishers belong, is active. "He [Ruff] has groups all

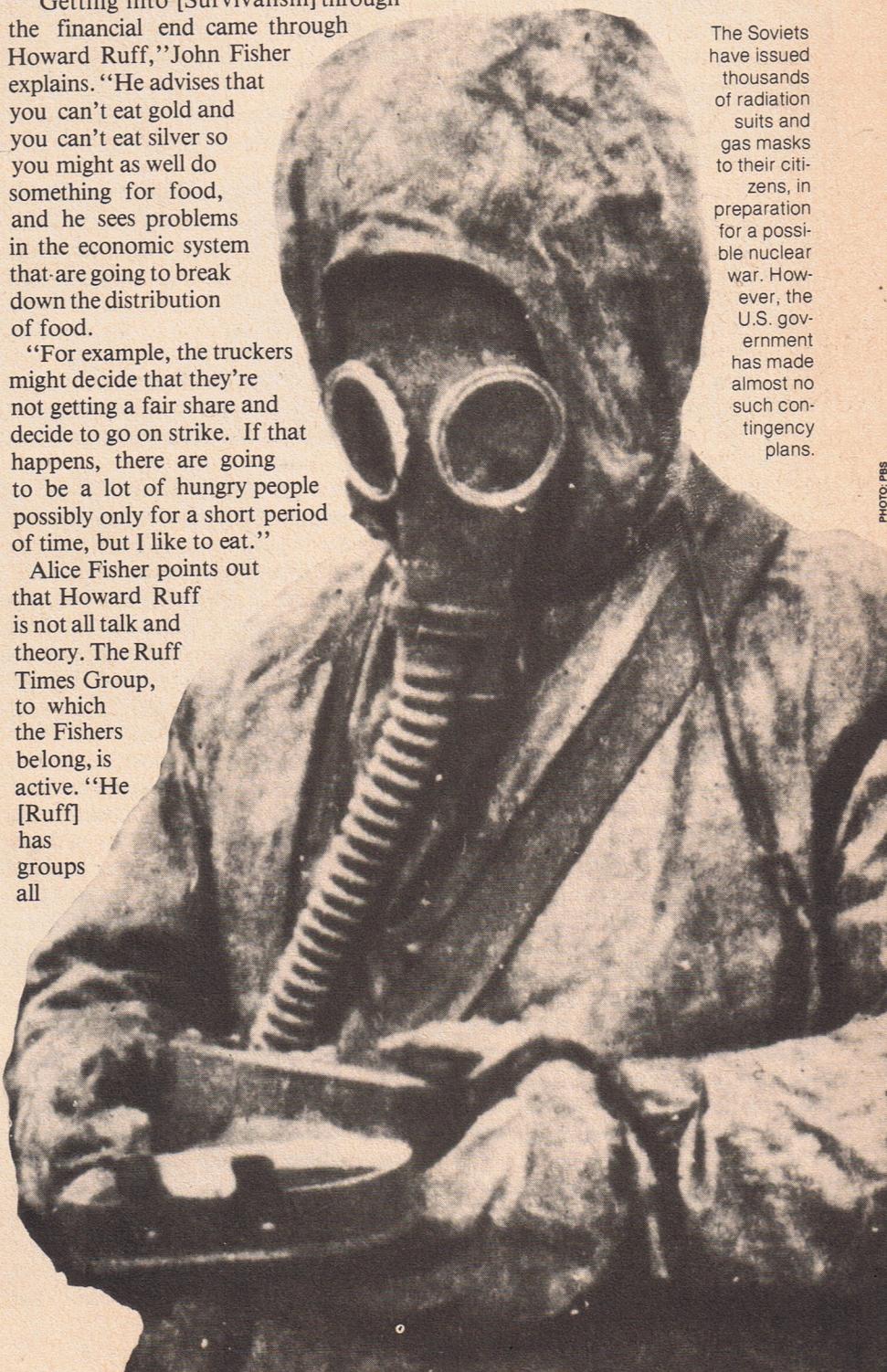
over the country now, where people get together and discuss how they can better protect themselves against the coming monetary crisis."

"One of the things our group leader did was set up a corporation and within the corporation he went out and found he could buy food (freeze dried and dehydrated) directly from the manufacturers," says John, "as opposed to buying it from the distributors. So, in essence, he set himself up as a wholesale distributor for the group."

Economic collapse brings in an area of Survivalism that many view as being racist, though Survivalists view it as simple pragmatism and realism. Economic

The Soviets have issued thousands of radiation suits and gas masks to their citizens, in preparation for a possible nuclear war. However, the U.S. government has made almost no such contingency plans.

PHOTO: PBS



survivalists are afraid that with the breakdown of the economy will come ravaging urbanites (read: blacks and Hispanics) who will look to take by force the goods the government is no longer giving them. "Somebody wrote that you are safe in inverse proportion to the number of miles that you are away from the population centers," comments John Fisher, and he is making sure that he has inverse proportion on his side.

"At any given point in the society, we are dependent on voluntary cooperation of people in going along with the rules that the government has set down," he says. "If all the sudden all the people on welfare decide that they're getting the short end of the stick and that the white collar worker and middle America is making all the money, and they decide to go and take it away from them, then you have a Watts on a grand scale and there's no way the police department can control it."

The Fishers' main concern is with economic collapse, but they believe we're in for a "rough" time" on all fronts. "R.E. McMasters has written a book called *Cycles of War*," Alice mentions, "in which he says that we are at a point when all kinds of cycles are coming together. According to his reading of them, there's going to be a war sometime between 1982 and 1985. There are also agricultural and environmental cycles."

John continues, "There's the Jupiter Effect that's changing our weather system and possibly changing the way Spaceship Earth is running, because the earthquakes which are happening with a great deal of rapidity these days are supposedly coming to a peak in 1982, again on a cycle basis." The Jupiter Effect is an unusual alignment of planets that some scientists believe will reverse the polar magnetism of the planet and trigger environmental disasters.

"So you have earthquakes that can mean a lessening of food production and you have a monetary crisis and you have projections of war all really intertwined. I don't think any one of those things are out there on their own. They all lean against each other. These events are so interwoven that you could have one seemingly unrelated event kick over the first domino. If the economic system of the world is as I think it is, it could just go roaring through and create all kinds of havoc. That's what makes me a Survivalist."

Of course, not everyone agrees with or even particularly likes what the Survivalists have to say. The movement has been called a moneymaking scam that plays on the fears engendered by a tight

economy and diminishing faith in the government.

There is no doubt that a handful of people are making big bucks off this trend. A mere \$39,000 will buy you an underground apartment in La Verkin, Utah, that comes complete with a four-year supply of dried food stuffed into the walls. Architect Joel Skousen will happily design a custom-built survival house for you for \$250,000. For the less flashy, a modest bunker can be attained for about \$3,000.

Survival Inc., in Carson, California, is the most well-known of the mail-order houses which provide Survivalists with goods ranging from freeze-dried foods to radiation suits. Its owner, Bill Pier, also a true believer in the cause, claims that he is stocked and ready to face the economic collapse of society. His personal economic collapse is not a real cause for concern, however, since his company grossed over \$1 million last year.

Although Bruce Clayton compares the cost of survival with that of buying a car—"If you compare the junkiest jalopy you could possibly get versus the nicest Coupe de Ville, you've just about got the range. If you've got a lot of money you can spend a lot, but people who don't can still improve their chances with relatively small expenditures"—not much in the field of Survivalism comes cheap. (Even Clayton's book sells for \$20 in hardcover.) Though he stresses that any money spent on survival is better than nothing and certainly better than what the government will offer you (50 cents per person per year is currently spent on U.S. civil defense), Clayton admits that he has personally spent "a couple of thousand dollars on each member of the family."

When you start getting into the recommended guns that most Survivalists feel they need, the cost really rises. Kurt Saxon, writer, publisher, chemist and gun afficianado, is one of Survivalism's main proponents of guns for survival purposes. He is the author of four volumes of *The Survivor*, a sort of "best-of" collection from his now-defunct newsletter by the same name. Saxon recommends being well stocked with ammunition and guns rather than gold. As he puts it so succinctly, "One of us is going to get both the gold and the gun. I say it's the person with the gun." Understandably, this kind of attitude unnerves more moderate Survivalists, because it gives rise to a whole sub-section of the Survivalist movement which attracts people who Bruce Clayton characterizes as "unattached men in their middle 30s who are lonesome for Viet Nam." The

way he sees it, "They miss the war zone and they look forward to seeing something like that established here. They look forward to the burning and looting and pillaging and raping that they have had to give up." Survivalists feel that because they have provided for themselves, they will be particular targets for the lunatic fringe who carry this arsenal with them.

There is also a large, blatantly racist element in Survivalism that many object to. The prevalent fear of raging urbanites seems almost reasonable when compared to the sentiments of right-wing groups like the Christian-Patriots Defense League in Louisville, Illinois, or a faction of the Sheriff's Posse Comitatus in rural Wisconsin (to name only two), who are armed and ready to fight off Jews, blacks and anyone else who doesn't seem "American" enough to them. These extremists are undoubtedly drawn to the fantasy of militant self-sufficiency where they no longer must answer to a government they feel panders to minorities. But, in fairness, the Survivalist movement certainly has no corner on the racist market, which is visible among non-Survivalists in probably greater numbers.

There are still others who feel that the Survivalists undermine people's faith in their ability as a society to find constructive solutions to their problems. By being stocked and ready for disaster they create a climate in which disaster is inevitable. Stewart Brandt, editor of *The Whole Earth Catalog*, fears he may have helped spark this craze, since his best-selling catalogs encourage self-sufficiency. He has been quoted as saying [New West magazine, February 1980], "It's paranoid and catching and it doesn't work."

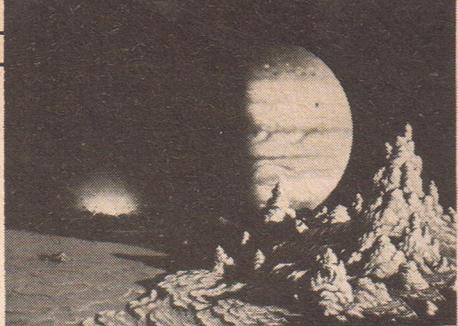
Economist and author Adam Smith commented in a *New York Times* book review ["Get Out of Town" January 25, 1981], "The standard of living must include policemen who police, sanitation men who pick up the garbage, courts and universities and institutions that function. . . . If compassion will not do then even mean self-interest should tell us the solution must include them all, not merely the readers of the prophets who are safe in the basement."

No matter what one thinks of this provocative movement, it is hard to dismiss it because it touches on so many issues that face each of us directly or indirectly as Americans. To form an opinion on this trend forces one to reflect on how much we do or do not trust our government. It challenges us to meet in our own way the problems that Survivalists are meeting in their's. F

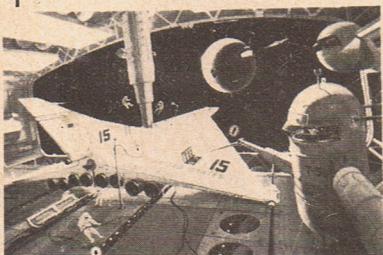
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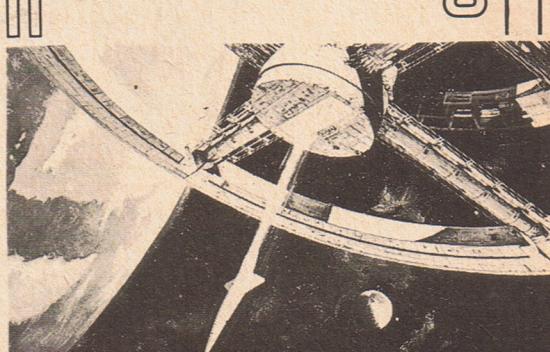
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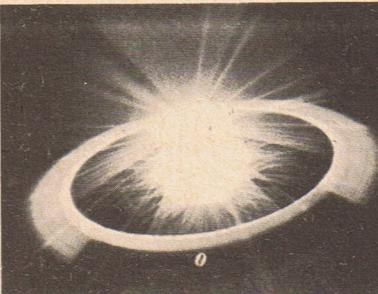
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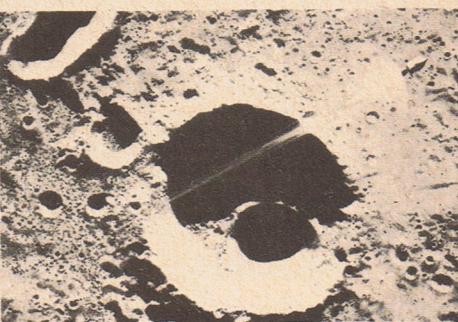
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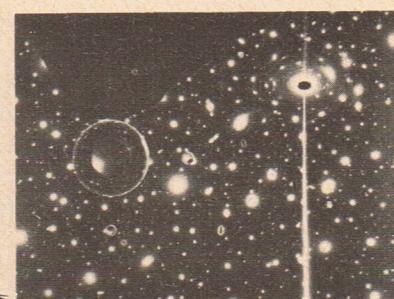
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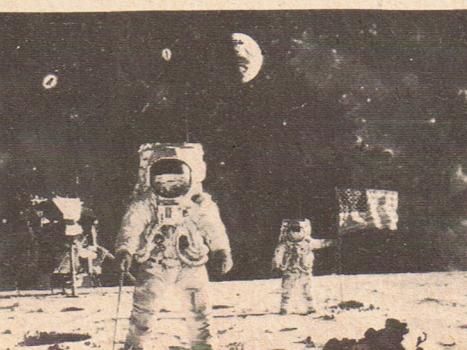
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ART

ELECTRIC SCULPTURES

By LARRY GARTEL

When most people think of video, they generally think of viewing a videotape, a collection of live moments animated electronically to create a logical pattern of motion. This could be considered "standard video processing."

Video art, on the other hand, is forming new and different relationships with the participating spectator. For example, through this new medium, we are made aware that the video screen, the rectangular focal point of information, can become part of the sculptural art form itself. From there, video can branch out further into becoming an "electronic environment" consisting of monitors, wires and other video hardware—the tools for carving an electronic image. And then, of course, there is the image itself.

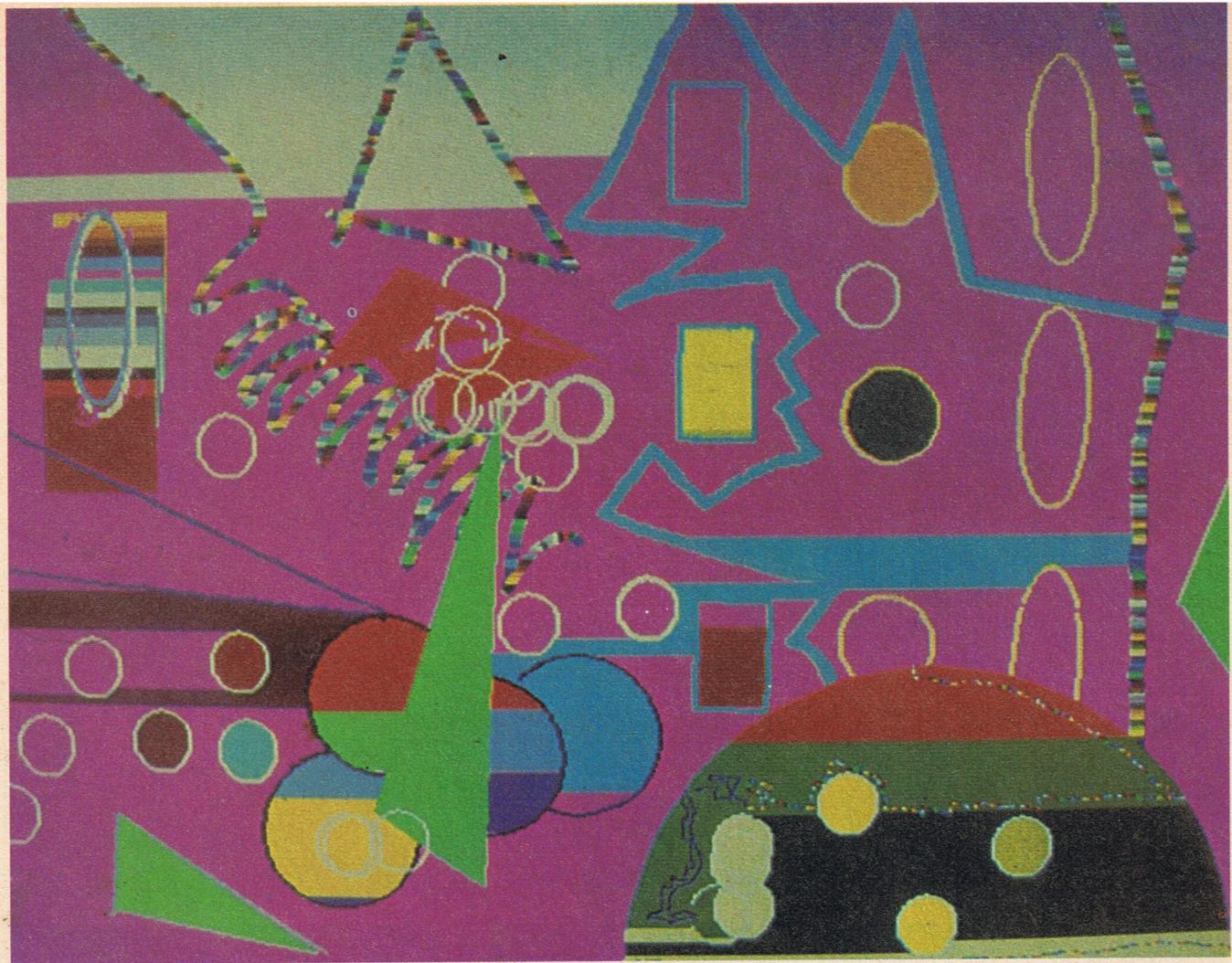
The examples of video art on these pages were created on the "Video Palette," designed by Digital Effects. The research and development that went into this system was funded by the J. Walter Thompson advertising agency. The agency's main objective was to have a system that could electronically produce imagery ready for broadcast. J.W.

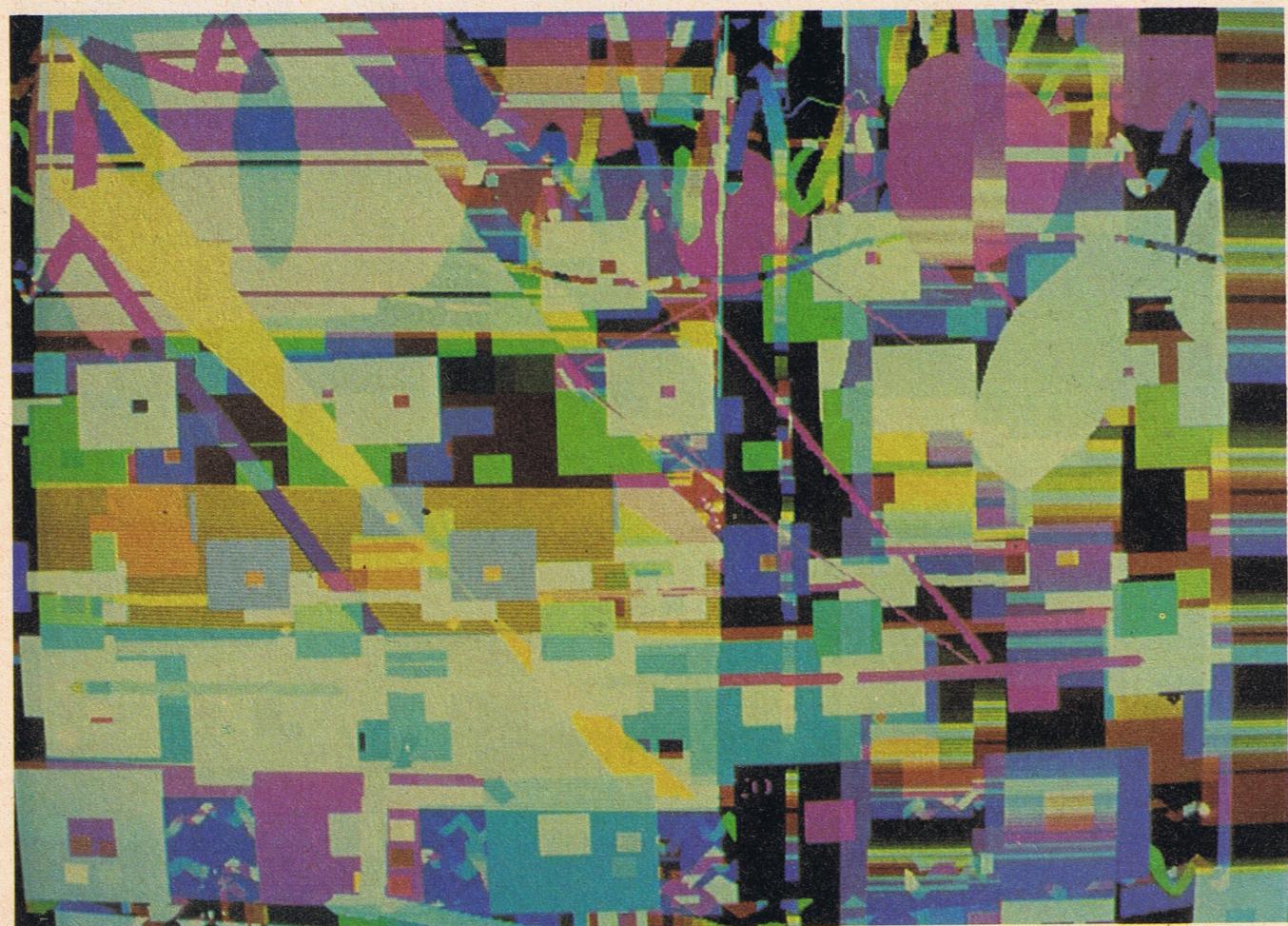
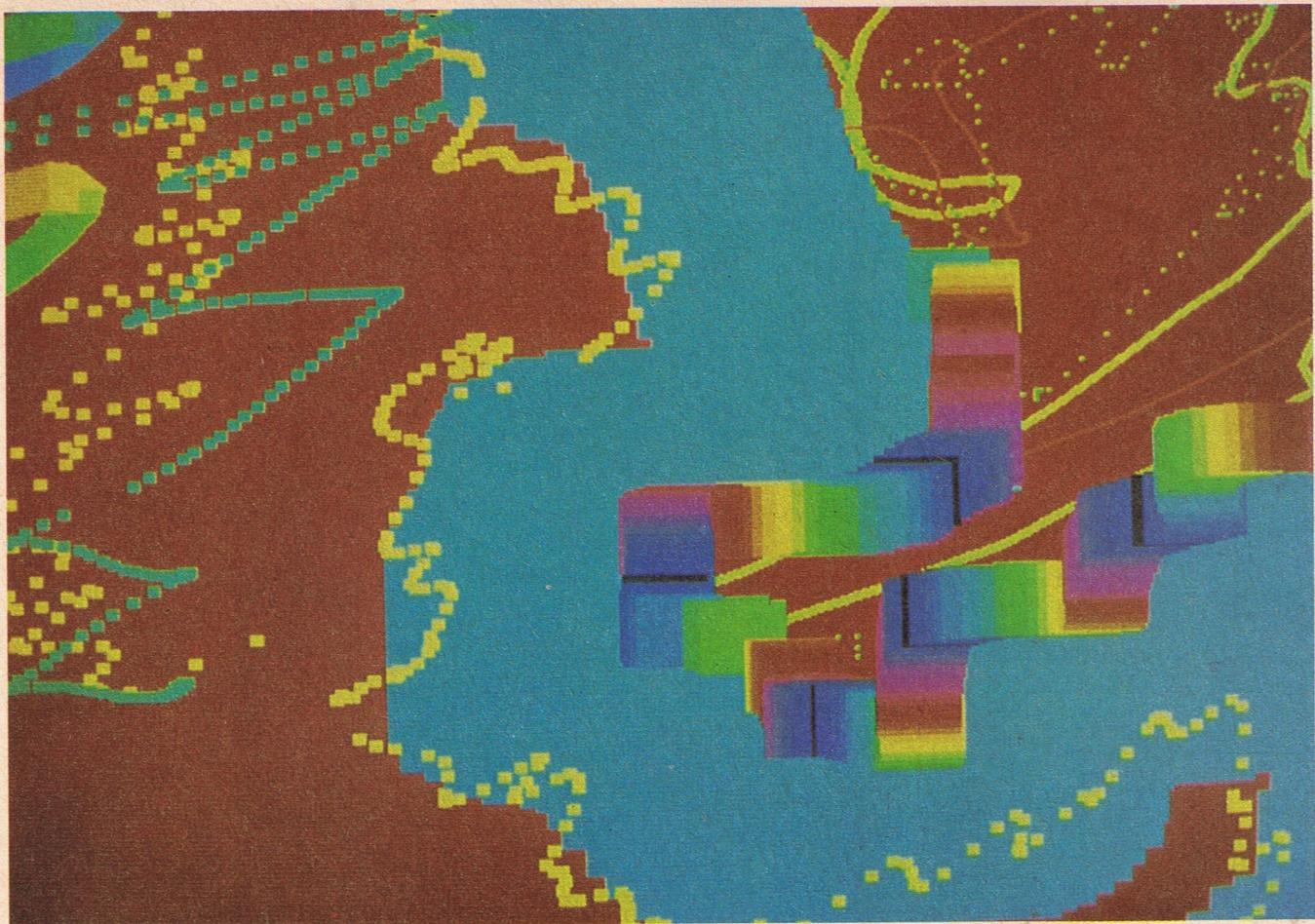
Thompson was interested in animatics and special effects image processing. Animatics deals with the creation of lines to produce the look of movement via computer. With the aid of memory and storage of information in the computer, it is possible to "replay" how a drawing was created line by line. By doing this, the look of real-time animation is achieved.

How the System Operates: First, there is a large 30 x 40-inch video "drawing table." The whole area can be used for illustrating, or a smaller portion can suffice by simply designating the corners of the area with an electronic stylus. The functions post themselves on the monitor, and by touching the stylus to certain areas of the tablet that correlate with the monitor you can activate the functions. Another part of this system is the computer typewriter. When you wish to "save" (store) an image into the memory department of the computer for further use or future viewing, you can give the image a name and type it in.

There are different functional "menus" which serve different purposes. For example, the "illustration menu" is where these drawing functions are

stored. It contains such handy modes as: "stream," which is a smooth flowing line; "broken," which breaks up a line when the hand picks up the stylus from the drawing table; "point," which creates straight lines by setting up two points that will be joined when the second point position has been designated; the "flood" mode, which fills an enclosed shape with color and acts as an erase by selecting the background color to go over an area that is unwanted; the "cycle" mode, which runs through the entire color palette that had been selected, thus creating a rainbow effect; "no cycle," which draws only one selected color at a time; and, finally, the "magnification" mode. This last is a most useful tool which can enlarge or reduce the size of a "stream" line or the size of the total drawing. It can magnify a particular portion of a drawing, and further detail can then be incorporated into that area, then reduced back down to the proper proportion. In magnifying, you can add additional color to even out and smooth a line that appears to be jagged because of the digital system. No round shape is totally round; therefore, by enlarging specific areas and then plac-





Information and education must consciously serve us toward productivity rather than selfish economical rewards at the expense of the destruction of our society.

ing the stylus in the "line" mode, it is possible to transform squared corners into more rounded shapes by setting the "magnification" mode to create a series of small, gradually angled lines.

"Magnify" mode has sizes from 1-50, which gives the artist considerable latitude in which to work. The more variations that are built into the system, the more control the artist has in creating. Every day, the system goes through some sort of development. But by no means does this indicate that the machine is ineffective or lacking. Like any machine that performs functions it can always be updated, modified or expanded upon. At the present time there are 32 different colors that can be used in one drawing. However, continuous development has made it possible for the next machine to be designed to have 250 colors.

The "palette menu" stores all the various color palettes. Here the scale of tint and hue can be altered by changing the degree of red, green and blue. This is like the sliding scale of the "magnification mode." The scale goes from 1-250. Just a slight modification can change the whole look of a drawing. In the "play and replay menu," a recorded image can be replayed line by line as it was being developed. This is done by typing in a name for the element drawn and incorporating it into the memory of the computer. The progression of movement creates the illusion of animation. Thus, using all these elements, the "Video Palette" creates the first generation of broadcast-quality video imagery.

Information of all sorts is being documented onto video. The distribution of information is only limited by the number of television monitors in existence; and right now about one third of the entire world's population owns a television. Most of this percentage lies within the boundaries of Western civilization. Information, therefore, plays more than a static role of enlightenment. It is a learning and development process wherein ecological and sociological situations can begin to be reorganized and clarified. Morally and ethically, information and education must consciously

move us toward productivity rather than selfish economical rewards at the expense of the destruction and deterioration of our society. The more we concentrate on education, the more we will begin to understand ourselves.

Video is the single most effective device for exemplifying the vision and construction of an individual's point of view. The new generation of "closed-circuit," independently produced video art is a strong force in the battle to preserve the freedom of democratic living. The artists are not at the mercy of national or governmental programming. This is a most vital position. The independent producers, unlike more "commercial" broadcasters, are not told what to do and their work is not censored. They can express themselves as they see fit. (Of course, they have to have the business sense to market and "video-merchandise" their work if they choose to do so.) Independent video means the solo formation of an artistic endeavor—one individual's attempt to transmit his ideas to another person's mind.

But the creative procedure is not a simple process. The tools used to create video are not at the corner art supply store. They are available for sale at astronomical costs. The production and editing equipment needed to produce tapes could run into hundreds of thousands of dollars. Access to rental equipment isn't always available at the time the artist may desire it. To "aid" video artists with their projects, the government gives out grants to those who *they* feel merit the financial assistance. This defeats the philosophy of "independent imaging" and leaves video artists to find a way to the access of equipment that they need. This is not an easy assignment. Most equipment is tied up with commercial (revenue-producing) studios.

It is interesting to note that the birth of video has been nurtured by artists rather than engineers. In the developing stages, artists had merged with video designers in order to make the tools that would make the art. Not until companies saw commercial use for video hardware did they "dare" get involved. Big money had to be invested in research and devel-

opment in the hopes of long-term profit. The creative individuals put their "ideas and concepts" into the formula, making further amplifications. These synthesized relationships will continue into the future, as large corporations begin to realize the value of "aesthetic forces." Technology cannot flourish without the involvement of artistic incorporation.

Humanity's innermost desires have remained the same since the beginning of time—the need to create, the thirst for knowledge. These video drawings are a modern update of those needs. The electronic colors are in keeping with today's emotional circumstances: the blue, cyan and magenta of the television screen are responsible for bringing the Vietnam War and other historical events right into our living rooms. Needless to say, our power of vision and emotional expression has had a close relationship with the previewing of images on television in the last 20 years.

These video sculptures are in direct response to the growth of televised imagery. No longer are we compelled to accept simple videotaped narratives of events. Video artists are following the example of the abstract expressionists. The depiction of reality is not necessary to generate the emotional reaction of its viewing public. The video drawing illustrates a future transmission of information.

Today's sophisticated video equipment can perform a variety of functions. There is a palette of more than 200 colors. Random lines can be drawn at different magnifications. Shapes can be pre-selected (squares, circles, triangles, etc.) and filled with color. Rainbow effects can be achieved too. Images can be repeated as much as they can fill the screen. Erasing capabilities exist, and individual colors can be changed without affecting the rest of the total picture. A multitude of images can be produced to create a new and exciting art experience.

But it is not the machine that is actually conceptualizing a work of art. It takes the emotional coordination of the human mind to create an image. Technology is a tool in achieving human potential—immortality.

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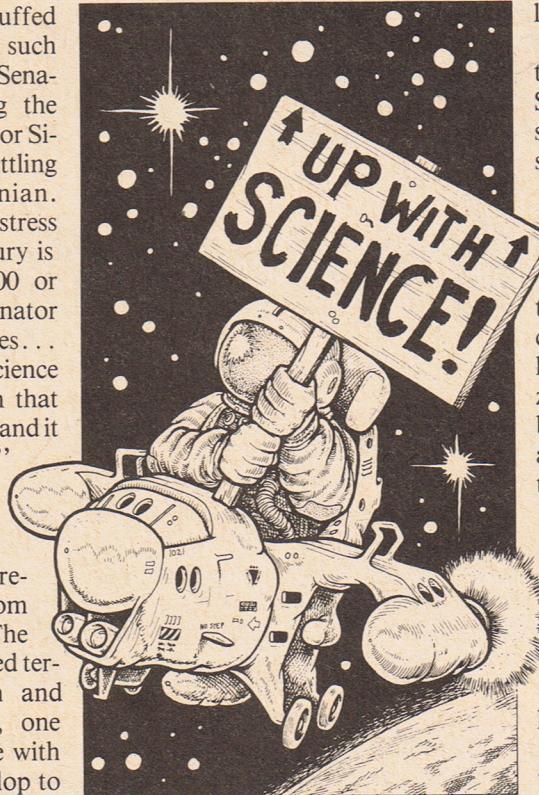
Toads and Snakes

"What do we care about stuffed snakes, alligators and all such things?" A quote from Senator William Proxmire, awarding the Golden Fleece? No, that was Senator Simon Cameron, back in 1861, battling against funding the Smithsonian. "When we are talking about the distress of the country . . . when the treasury is empty . . . we are to parcel \$6,000 or \$10,000 to preserve what . . . a Senator over the way called toads and snakes . . . I am tired of this thing called science here . . . we have spent millions in that sort of thing for the past few years, and it is time it should be stopped . . ." But in spite of Cameron's ridicule, pro-science Senators kept the funds flowing.

The People's Republic of China recently ousted anti-science forces from its top levels of government. The crimes of the Gang of Four included terminating all scientific research and higher education. For example, one researcher was thrown out to live with the hogs and fight for scraps of slop to eat. (Even today he fears his government so much that he asks that his name be held confidential.) Countless others carried their stories of humiliation to the grave. But today the Gang of Four is imprisoned, and China plans to launch astronauts by the '90s.

It would be nice to conclude that the Proxmires and Chiang Chings of this planet must inevitably give way before the forces of progress. But it doesn't always work out that way. When Marco Polo left China in 1292, for example, that nation boasted four-masted ships which could carry 600 sailors and tack into the wind on the high seas. But back home, the Europeans were making do with dinky single-masters and hadn't even heard of tacking. Why was Chinese naval technology so superior?

Scientific discovery was a major motivation of Ming Dynasty China. Cheng Ho, for example, sailed as far as the southern tip of Africa collecting anthropological information and mineral, plant and animal specimens—probably including some toads and snakes! His voyages covered 100,000 li (one li equals about $\frac{1}{3}$ mile). Cheng Ho wrote, "Our sails, loftily unfurled like the clouds, day



and night continued on their course, rapid as a star . . ."

But on his return in 1433, Hsia Yuan-Chi, preaching the Mandarin equivalent of Proxmire's "Not a penny for this nutty fantasy," persuaded the emperor to mothball Cheng Ho's fleet. A few years later they jacked all ocean-going ships! To top it off, in 1477 the vice president of the War Office became incensed over even Cheng Ho's written accounts of his voyages, calling them "deceitful exaggerations of bizarre things," and had them all burned.

So it was that the once-backward Europeans became rulers of the seven seas, and Chinese dreams of exploration were extinguished for half a millennium.

Now we propose building solar "sails, loftily unfurled like the clouds," which will carry space settlers to the asteroids and beyond. Will the captains of these ships speak Chinese? Japanese? Arabic? Russian? French? English? I hope we'll hear all these languages and more out there. But one thing's for sure: I don't want to be left behind. That means making sure the anti-progress forces don't pull Hsia's trick of locking us up in a

low-tech country for five centuries.

How can we best ensure that we keep the forces of progress rolling? In the September 1980 and February 1981 issues of *FUTURE LIFE* I asked readers to send me their ideas.

Ralph Purvis warned me, "Probably our greatest weakness is to forget that a warped or misinformed mind can still be brilliant. The people behind the anti-tech movement understand psychology . . . and to supplement this they have duped a large force of dedicated, zealous people to work for them . . . I believe they can be beaten—if only we are willing to put the necessary effort into the fight."

"The only way they can win is for the rest of us to laze around and hope for a miracle."

Where should we start applying that elbow grease?

Christ Kanoles wants to take the battle straight to Ken Bossong and his Coalition Against Solar Power Satellites. "Flood their office with mail. They would then have to open each piece as it might contain a donation. This process will consume both their time and their money, hopefully enough so they will discontinue their drive against SPS." (You can write them at CASPS, 1110 6th St. NW #300, Washington, DC 20001.)

John Matthews, however, cautioned me that "we cannot allow our concern to lead us to succumb to our desires to put down the vocal opposition unnecessarily." He must have been reading Kanoles' mind, as he went on to warn us not to "flip off dumb-ass postcards to our loyal opposition." Well, I still like Kanoles' idea, so maybe we can strike a happy balance by sending intelligent, polite deluges of mail to Bossong only when we need letter-writing practice and don't have a constructive target for our energies that evening.

John P. Conlan pointed out that by joining Scientists for Accuracy in the Media (1034 La Brea, Pocatello, ID 83201) we can become active in countering those erroneous anti-tech statements that creep into the press.

Vassily Haakon observed, "Scared people are too afraid to rationally decide what avenue to take in their futures. In

(continued on page 65)

OUTLAND

'High Noon' In Space

By ED NAHA

Most people envision the future in very idealistic terms," says filmmaker Peter Hyams. "It's all very sanitized and neat, with jumpsuited people in permanent press outfits zipping happily along on conveyor belts. Well, I don't share that vision. *Outland* shows a very different side of the future, a side that is very much like our present and our past."

Outland, directed by Hyams, is a science fiction adventure story with a different look. Set on Jupiter's volcanic moon Io, it is an atypical space opera that, according to Hyams, "does not include one ray gun or any spaceships slewing about the corridors of time. It's about a space mining colony. Mining colonies have, traditionally, been hard, gritty, unpleasant places filled with people who are looking over their shoulders rather than ahead, trying to stay alive and putting up with all kinds of horrible abuse while attempting to make some quick, big bucks."

This gritty philosophical stance, in essence, is what gives *Outland* its clout. In the near future, a space mining colony run by foreman Mark B. Sheppard (Peter Boyle) is out to make a big score no matter what the cost in terms of human lives. When space marshal William T. O'Neil (Sean Connery) arrives and senses there is skullduggery afoot, he does his damndest to track down the cause of a number of mining accidents and find out who's cutting corners and why. Sneering from the sidelines are Sergeant Ken R. Montone (James B. Sikking) and Dr. Marian Lazarus (Frances Sternhagen), a world-weary sawbones who's seen just about every type of human degradation and doesn't really

care what goes on in the colony.

Outland's rather dire plotline translates into equally dire physical designs for the future. That, according to producer Richard A. Roth, is another plus point for this maverick movie. "This film is definitely *not* about sleek hardware," he states. "It's about what real life will be like in the future in this type of environment. There are no monsters, no technical gimmicks, no fantasy effects. We tried to make this as realistic looking as possible.

"We realize that we're definitely treading a fine line here in regards to our attitude about the future. It's not a particularly cheerful slant. Still, we think the movie will appeal to a science fiction audience because of its realism. When you're talking about life on another planet you have to show a certain amount of spaceships, science fiction designs and scientific concepts. *Outland* has all the traditional elements of a science fiction film, but shown in an untraditional way. The barracks are dirty. The men are grubby. We've tried to veer away from the *Star Wars* fantasy approach and go for a more credible one.

"I don't think that people who dislike science fiction in general will turn their noses up at the film, however, because it's very compelling on its own terms. It has a solid science fiction background but it also has a plot. I think that a lot of science fiction films meet with critical abuse because they're no good. Period. No matter what label you stick on a film, if it's no good, it's no good."

Above: A computer bank on Con Am #27 gives a readout for a medical checkup. Below: Life on the mining colony is boring, unlovely and very depersonalizing.

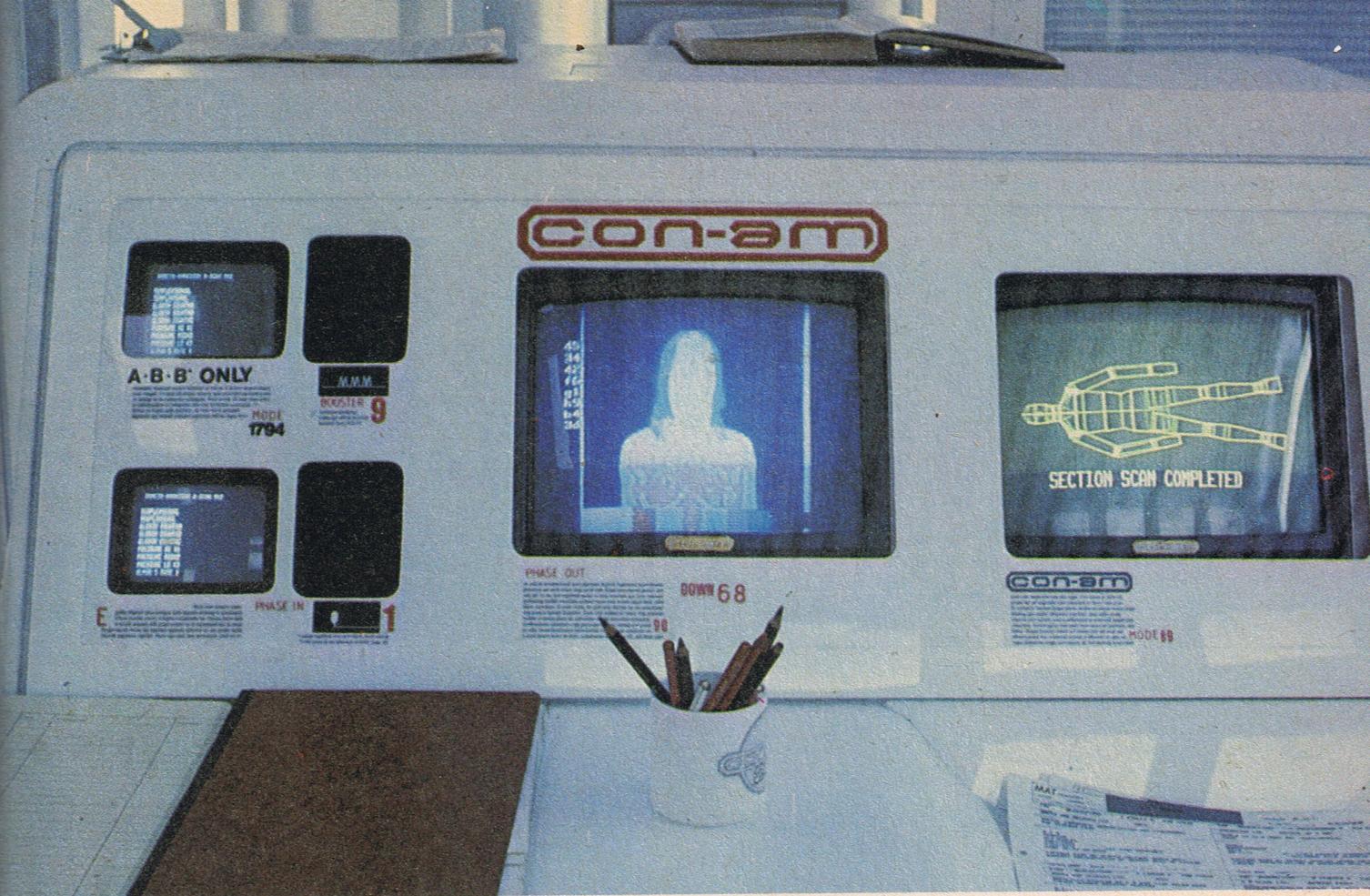
"*Star Trek* didn't work as well as it could have because it didn't have a strong story. No matter what the dazzling backdrop, you have to have a good script to have a good movie."

Despite the film's realism, however, Roth stresses that it *does* have its share of special effects. "God, yes," he reemphasizes. "We had a really creative crew work on the effects for this movie and the effects are really impressive. *Outland* doesn't take place in one corridor. You go outside and see this futuristic set-up and this planetary setting. But we didn't include these sorts of effects for exploitative reasons. We included them because they fit in with the storyline. The effects arose from a deductive process, a smooth flow within the context of the script; not from an inductive process, trying to cram in as many extraneous sequences as possible in order to attract an audience."

Filmed entirely at Pinewood Studios in England, *Outland's* crew went to great pains to create a vision of future life that tied in with the grim story line. It was at Pinewood that Hyam's money-oriented mining colony, Con-Amalgamate #27, was constructed.

"Con-Am doesn't look like your typical science fiction space settlement," Hyam says. "We decided we wanted this place to look like a present day off-shore rig, with all the grittiness that suggests. We wanted to create a mining colony that would house the barest of essentials and be very penitentiary-like: a space-age frontier town—there out of necessity rather than elegance."

"In this film, you see the wheels, you see the gears, you see the pipes. It's dusty, it's dirty, it's unimpressive in an artis-



tic sense. I'd liken these sets to the actual designs used by NASA when the manned space program first came into being in America. If you looked at the Apollo capsule, you saw it filled with gears, rivets and gauges. There was no attempt to beautify the craft, to put Naugahyde on the inside of the spacecraft to make it *look* nice. It was designed to hold together and not burn up. Totally functional, period. We went after that concept in *Outland*. Imagine the Spartan design that would be required to house 2,144 people in a comparatively small amount of living space."

Con-Am #27, conceived by Hyams, was designed by production designer Philip Harrison. The miniature was built by Martin Bower and Bill Pearson (of *Space: 1999* and *Alien* fame) and special effects designer John (*Star Wars*) Stears. According to Bower, the creation of Con-Am #27 was as tough for them as living on the outpost was supposed to be for *Outland's* fictitious futuristic miners.

"It turned out to be very complicated," Bower says, "although it shouldn't have been. It wasn't a real challenge creatively because we were working mostly from Harrison's designs

and because the place was supposed to be built realistically. We're used to the realistic approach because of our work on *Alien* and *Space: 1999*. We thought, 'Okay, this should be fun.' We were given a host of paintings to give us a glimpse of what the future was supposed to look like in this film and we took it from there.

"We didn't work at Pinewood much at all. I think we were there for perhaps two weeks. We built the models at our own Bowerhouse Studios so we didn't have to deal with on-the-set hassles. Harrison and art director Malcolm Middleton would visit us and keep us up-to-date on new drawings and ideas but we were basically left alone, given a lot of leeway because of our past track record. However," he adds, with a trace of whimsy creeping into his voice, "unforeseen circumstances made this model work a bit more exhausting than we had originally envisioned.

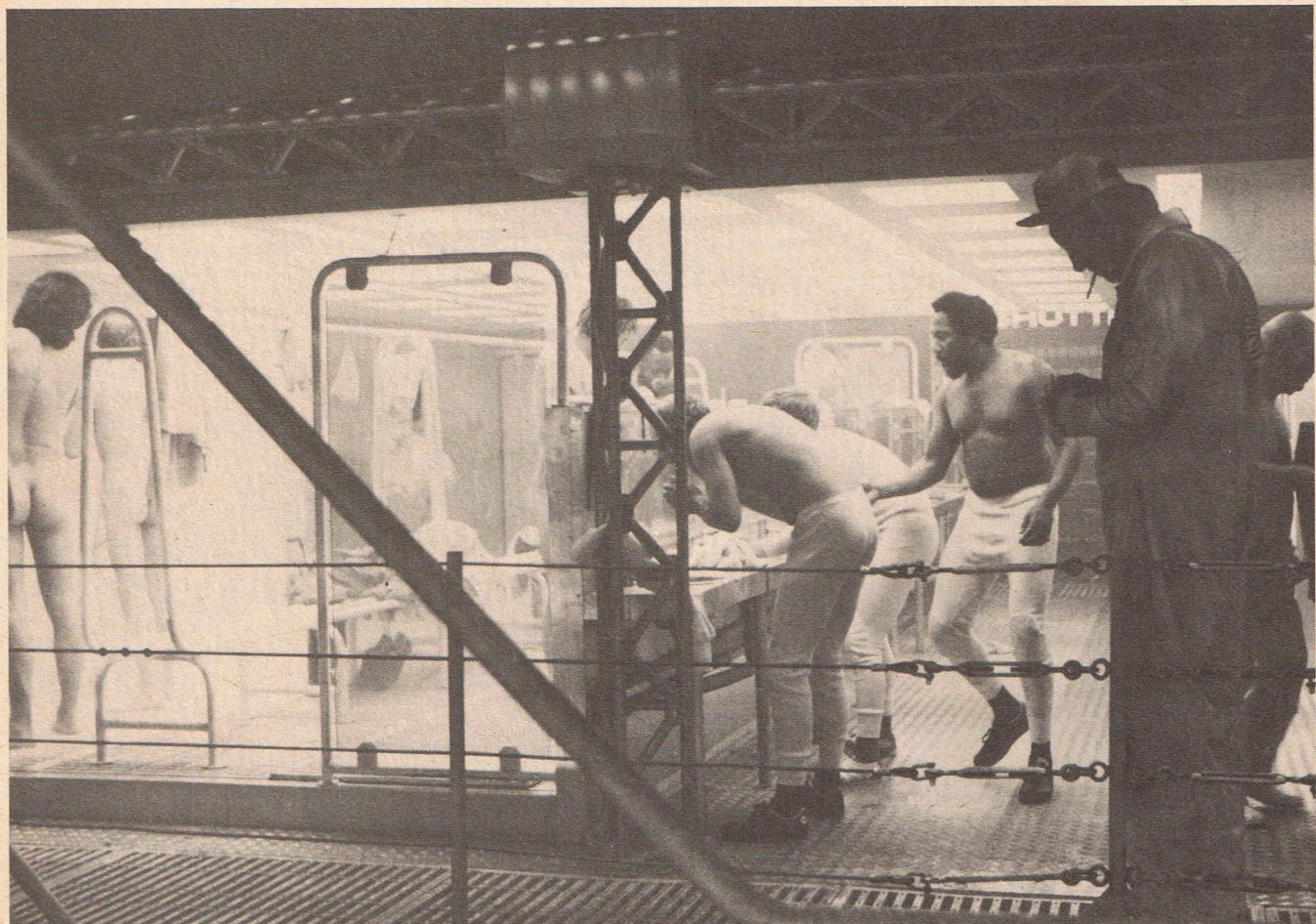
"Bill and I were the only people working on the model. We wound up spending 2,400 hours over a four-month period of time on it. It was a case of eight in the morning until midnight, seven days a week, with an odd day off every now and then. We built all the models for the film during that time, except for the launch

pad which was done at the studios by John Stears' boys. It took us three and a half months for the refinery alone. There are five basic sections to it and we allowed ourselves about three weeks per section. If we took more time than that, we wouldn't have had enough time for the next unit.

"There were a lot of exciting ideas we wanted to incorporate on the Con-Am model but we just couldn't because of both time and money restrictions. That was very frustrating. One of the best ones we attempted was the inclusion of a goodly amount of futuristic vehicles surrounding the refinery. We figured that, since this was the futuristic equivalent of a mine, there'd be updated versions of today's mining equipment puttering about it, diggers and things. We just couldn't squeeze that idea into our schedule, however."

After three and a half months, Bower and Pearson went to Pinewood "to put the refinery together and also to detail the launch pad to keep it consistent with the modeling we had already finished."

The completed Con-Am miniature was approximately 18 feet long, representing two miles of futuristic architecture. Constructed of a myriad of different types of plastic and metal, it housed



The miners have to live in uncomfortably close quarters—these are their sanitary facilities.



Violence breaks out in the dining hall—an indication that something is terribly wrong on *Con-Am* #27.

five separate modules, each one with a specific function: the refinery, a solar station from which power is generated, two greenhouses designed to produce both vegetables and oxygen, the living quarters and the space shuttle launch/landing pads. Most of the modules were mechanized and included moving radar scanners, elevators, gantries and deflector shields.

"We thought we had done a pretty terrific job," Bower chuckles, "when two setbacks almost sent us 'round the bend permanently. The first problem we had heard rumors about before we entered the studio. Peter Hyams was considering changing the color of *Con-Am*. That thought terrified us. We went to a great deal of trouble before we actually built the refinery to create a prototype for Peter. He lit it and shot some footage of it and said it was fine. After we built the model, we then painted it and dirtied it down, because with a miniature, applying a weathered look adds a lot of detail and realism.

"When we arrived at Pinewood, he suddenly decided that he wanted the model painted a lighter color. He said that it wouldn't show up strongly enough on the screen because it was dark

gray. He had the paint shop at Pinewood spray it white.

"When they did it, they used an ordinary spray gun, whereas when we painted it we used an airbrush and did each piece separately. You can imagine what happened. All the meticulously added paneling lines and the dirtied, weathering effects just disappeared. Bill and I sat down and cried.

"Then, to top that off, a couple of lads at the studio were carrying the greenhouse section of the refinery across the road and they dropped it. It was made of plexiglass and it just shattered. It had to be rebuilt. Bill and I didn't have the time, so some boys at the studio pasted it back together like a jigsaw puzzle. At this point, Bill and I actually went to a local pub to drown our sorrows.

"We were in a terrible state. I mean, our wonderfully detailed model was going out of the studio looking wonderfully detailed and coming back pristine white with all our little details erased. We'd spent a couple of weeks just working on the detailing. Point of fact: the dirtying was never put back for the finished film. I think that took a lot away from the realism."

Returning to their studio, Bower and

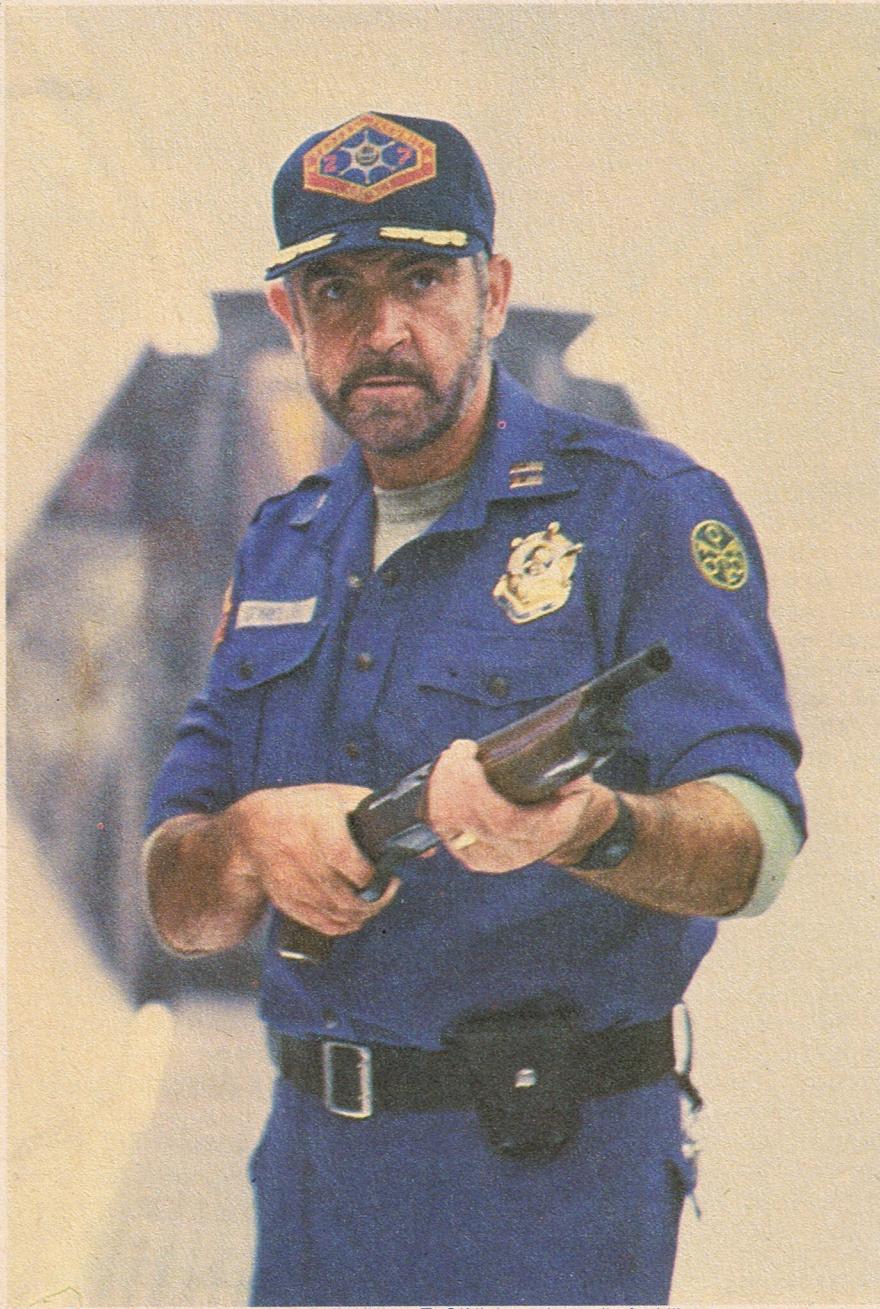
Pearson built the film's shuttle craft in only two weeks. "I think that's some sort of record," he laughs. "It was about four feet long and very rushed."

Meanwhile, back at Pinewood, Hyams and Harrison were supervising the construction of the film's oversized sets, the main one being the grim, claustrophobic workers' quarters. "It's very prison-like," Hyams explains. "There's a bunk area which stretches from the floor to the ceiling, layered with row upon row of metallic bunks; cages, really. The men have no privacy there. The living quarters were designed as if their function was to get the most amount of people in the least amount of space... just as a real mining outfit would try to do. Everything in this set was designed to be functional, from the split-level shower stalls to the locker room. It's totally cramped and overwhelming."

Other major sets included a future jail, consisting of glass-fronted cubicles devoid of artificial gravity (the prisoners float helplessly inside, moored only by oxygen lines) and a soft-porn leisure club, wherein two women and a man, enveloped by laser light, simulate copulation in a sort of Kama sutra au go go dance effect.



A prisoner floats helplessly in Con-Am's detention center.



Sean Connery plays space marshall William T. O'Neil, on the trail of a killer.

This latter element of the film was a tough one to bring to life, according to choreographer Anthony Van Laast. "Peter wanted something that was raunchy but not dirty," says Van Laast. "The effect we achieved is certainly not pornographic and it's much more erotic than sexy."

Effectively creating Hyams' bump-and-grind revue was difficult. Five dancers, three women and two men, had to be carefully selected. "We had to choose dancers with the right hair and body to fit in with the laser beams. The most exciting thing in the film is when their hair breaks through the light. We had to find dancers who had the strength to do this kind of dancing, rehearsing for five days; partly to build up the strength of the boys' thighs so they wouldn't get cramps. Also, to break down the inhibitions of the dancers. We had to find people who were compatible. If you're simulating sex for ten hours a day, it's easier if you like each other."

Adding to the realism on the set was the work of John Mollo, a costume designer who has worked on everything from *The Charge of the Light Brigade* to *ALIEN*. "Peter wanted it all to look very harsh," he says of his designs. "So all the clothes are company outfits which have been issued to everybody who works for Con-Am. We weren't designing space-age clothes. We tried to make them as ordinary as possible. This is an androgenous society and the leisure clothes are like the ones worn off-duty by men on an oil rig. If you have something 'spacey,' the audience will notice it, and it tends to take their attention away from what is going on. You really don't want them to notice what people are wearing. With our space suits, we've aimed for a more technological look, rather than the classical heavy space suits which people have seen before."

Being surrounded by dirt-caked sets and drab costumes made acting a challenge, states Frances Sternhagen who, as Doctor Lazarus, gradually changes from a cynical observer of life on Con-Am #27 to the marshal's ally.

"It was a little depressing at times," she admits, "although the story was great and both Sean Connery and Peter were delightful to work with. It was very hard for the extras and the actors with smaller parts who had to spend day after day in this one, smoke-filled set that was supposed to be the settlement's night-club. There was no air in there, just vast clouds of smoke."

Sternhagen found that the dust-laden futuristic trappings, as imposing as they



The inhabitants of the Con-Am mining colony suit up for the perilous surface of Jupiter's moon Io.

were, could be circumvented mentally with the right attitude. "The sets were certainly something to contend with," she says, "but you have to work around things like that. There were little challenges for me throughout the film, like pretending to work a computer or various technical gadgets. You find yourself having to spend quite a bit of time being very specific in your moves for the very short amount of time the take requires. I found that my background in TV commercials helped me get through this. In a commercial, while you're having to appear as if you're emotionally involved in a conversation, you have to hold up a can of spray cleaner in exactly the right position, so the light doesn't bounce off it and obscure the label and all that. You're carefully aiming this can while conducting a conversation. *Outland* was similar in that you'd have to speak while punching three buttons just to open a door leading out to the corridor. It just took practice."

Despite the film's rather pessimistic, grimy atmosphere, everyone connected

with it believes it ultimately holds an optimistic view of things to come. Many of its participants (although definitely *not* the producer and director) liken it to *High Noon*, the classic Western pitting sheriff Gary Cooper against a bunch of gunmen and a chicken-hearted town.

"The plot is right out of *High Noon*," says Martin Bower. "It builds up to a terrific climax, just like *High Noon*. It's an ordinary adventure story set in an extraordinary location. And in a location like that you can have lots of extraordinary things happening to people. It's more an action-adventure film than science fiction and it really should have people cheering."

"It's *High Noon* in space," Sternhagen adds. "Yes, there are definite elements of it in there. It's about one man, a marshal, acting alone. He can't get people to help him in his fight against corruption and he has a deadline imposed upon him to accomplish his task. Instead of flashing to *High Noon*'s clock on the wall to show you the time passing and the bandits arriving on the train, we

have computer print-outs and the shuttle sailing through space, approaching Con-Am. It's about a man who believes that evil should not be condoned and faces that responsibility on his own.

"I think that people will react to this movie in a very positive way, the same way they did to *High Noon*. There's a warm sort of emotional release in this film, a reaffirmation of traditional codes of honor."

Hyams is less specific about what effect the film may or may not have on an audience. "It's a strange movie," he concedes. "It's the first attempt to deal with the future as a location, a backdrop, and not a subject. The drama that unfolds concerns human beings caught in an environment created by other human beings. There are certain timeless elements to it: concepts of good, of exploitation, greed, evil. The hardware isn't in the spotlight, the people and their conflicts are. And, if you're a human being," he adds with a trace of humor, "you should empathize with what these other humans are going through."

•INTERVIEW•

Petr Beckmann

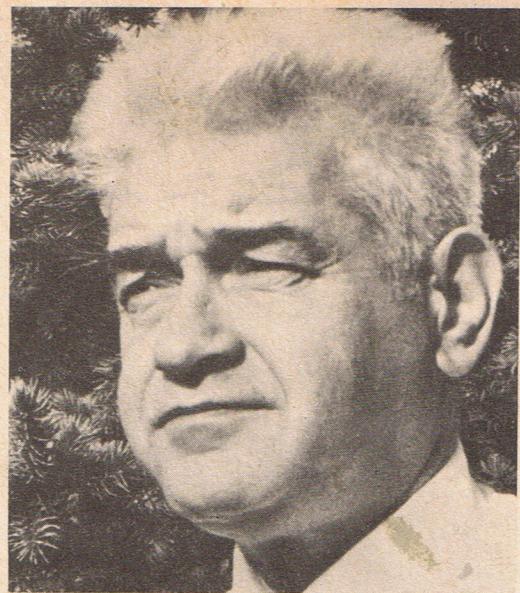


PHOTO COURTESY KARL T. PFLOCK

By KARL T. PFLOCK

Dr. Petr Beckmann is professor of electrical engineering at the University of Colorado. He was born in Prague, Czechoslovakia, where he earned his PhD and DrSc degrees in electrical engineering and worked for a research institute of the Czechoslovak Academy of Sciences. In 1963, he was invited to the University of Colorado and did not return to his homeland. He is the author of more than a dozen books—including the bestselling, controversial and highly informative *The Health Hazards of Not Going Nuclear*—as well as more than 60 scientific papers. Originally working in electromagnetics and probability theory, he became strongly interested in questions of energy and now publishes the lively and informative monthly newsletter, *Access to Energy*, in his spare time (one year, \$15 from Box 2298, Boulder, CO 80306; foreign subscriptions \$20. Sample copy, \$1).

Abundant energy is the key to the future—any future worth living. What would you say is the best way of organizing things to be sure we obtain that key and use it to best advantage?

Let the free market work. Leave people alone to pursue the most economic ways to produce energy.

In a free market for energy, uneco-

nomic approaches will not be attempted. Oil men will drill for oil and they will use secondary and tertiary recovery where they know these will work. For the generation of electricity, nuclear power will be developed—the only type of “renewable” energy in the sense that you can breed fuel.

Is there any one best form of energy production when cost, safety, impact on the environment, availability, etc., are considered? If not, is there a “best mix”?

There is no best form of energy for *all* applications. For some, the direct burning of fuel has the most advantages. For others, converting it to electricity first is best. The best mix is found automatically by the free market, Adam Smith's invisible hand.

For the generation of electricity, the answer is quite clearly nuclear, on all counts. If there were no political roadblocks, it would be the certain choice of the utilities. In fact, before it was politically priced out of the market, nuclear was always their first choice. But now they are coerced into using other less safe and environmentally benign methods.

Do any of the alternative energy sources—such as solar, wind, biomass,

and so on—show any real promise?

All of these sources can supplement, but none can substitute. The most abundant is solar, but under the best of conditions, it comes in at only one kilowatt per square meter, which makes it so uneconomical that only very few could afford it as anything but a rich man's toy.

I assume that you are referring to active solar systems rather than passive ones.

Yes. The passive systems have always had promise. Did you know that the Department of Energy has published a book on solar energy and architecture? It includes an illustration that shows how to plant deciduous trees on the south side of a house so that they shade in the summer and let sun through in winter. What amazes me is how the pioneers in the Old West did this without the help of a Department of Energy.

As for active systems, these were abandoned in the 17th and 18th centuries for very good reasons. Mainly, it was because solar is too dilute. With the advent of the Industrial Revolution, the switch was made to concentrated energy sources like coal.

It is important to understand that, unlike nuclear or coal, solar energy cannot be used to produce the materials needed to sustain it. It's too dilute.

In the near term, it appears that coal and nuclear fission will be among our principal energy sources. What forms of energy do you see as their likely replacements?

In the long run, I believe nuclear fission will replace our other energy sources, not only for electricity but for practically everything else. In Japan, they are already seriously considering making steel with nuclear-generated heat.

The solution to the transportation-energy problem, I believe, will be the electric car, which will solve the air-pollution problem too, with the electricity for the cars being generated by nuclear power plants. We would get rid of air pollution from cars and power plants at the same time, as well as the other forms of pollution now generated by fossil-fueled power plants.

The only pollution we would have would be the little from uranium mill tailings and nuclear power plant wastes. This would be a tremendous improvement over our present fossil-energy wastes—an improvement in quantity by a factor of roughly 3.5 million. And, of course, nuclear wastes are toxic only temporarily, whereas coal and other fossil wastes are, unfortunately, not radioactive, so they are toxic forever.

The period of danger from nuclear wastes is much shorter than we are led to believe by the antinuclear propagandists. The penetrating radiation is done with after about 30 years. After about 500 years, nuclear wastes are less toxic than the coal wastes produced generating the same amount of power.

You have been referring to nuclear fission. How do you see the prospects for nuclear fusion?

My remarks were meant for the most pessimistic case, that fusion would not materialize, but of course, that fuel breeding would be used.

I would say that the prospects for fusion, from the standpoint of achieving scientific breakeven—where you get as much energy out of the reaction as you put in to produce the reaction—are very good. This very well might come within five years. From that point to commercial generation of electricity will take something like another 30 years.

If breeder-reactor technology is highly successful, might it preclude development of fusion?

Definitely not. Fusion is overrated, as unavailable energy usually is. (The anti-energy people are always in favor of the energy that is not now available!) But

it is a very much better way of gaining energy than fission. The reward is so much greater, and you literally cannot run out of fuel as long as there is water in the sea.

Something that is not generally appreciated is that we have only begun to nibble at the two ends of the periodic table of the elements. In principle, the mass "defect," or mass surplus, mc^2 , is available almost everywhere, and we have only begun to release the potential nuclear energy around us. In addition, so far, only the mass surplus has been converted into energy, whereas, in principle, there is no reason that the entire mass can't be converted to energy.

For the far future, there is very much more in store. There is no theoretical reason why nuclear energy can't be obtained from the nuclei of virtually all the elements. So uranium fission and hydrogen fusion are only the beginning.

genetically, possibly environmentally, possibly by a combination of both.

The other is thermal energy from Earth's magma. The type of geothermal energy that has been exploited so far—geysers and the like—is limited to only a few sites, but Earth's interior is hot everywhere. When methods are developed to tap that heat, we'll have an energy source that is for all practical purposes unlimited. But this is probably far down the road.

There's a lot of enthusiasm for solar power satellites, but I don't see them as important for providing power to Earth. In the far future, as power sources for space colonies and industry, yes, but not for Earth in the near future.

The one energy source that is here, now, that is abundant—for thousands of years if we breed fuel—that is safe, reliable and for which the fuel source is domestic, is nuclear.

"Nuclear wastes are the only type of industrial waste you can completely remove from the biosphere. Nothing like Love Canal is possible."

Would you give us your thoughts on the promise of any "far out" but at least potentially viable developments you may see on the energy horizon?

The history of energy is one of greater and greater concentration of energy. As for solar energy, man is already harnessing it where nature has concentrated it: in fossil fuels, where it has been concentrated in time; and in hydropower, where it's concentrated in space. If you have to concentrate it yourself, say by growing plants, you find yourself up against other limitations: space, fertilizer, the need to grow food on the same land and so on. If you let nature do the concentrating and then just tap in, it could be made to work. But the promise is limited and viable in only certain isolated areas and special cases.

There are two things that could be big suppliers of non-nuclear energy in the future. One is solar energy via bacteria. Here I'm thinking of making hydrocarbons, fertilizers and food. These bacteria would be man-manipulated, possibly

You have mentioned breeding nuclear fuel several times. Just what is this?

Put simply, what is involved is a nuclear fission process in which a reactor is used not only to generate electrical energy but also to convert nonfissionable nuclei into fissionable (fuel) nuclei at a rate that produces more fuel than is needed to produce the electricity. A breeder reactor "fuelizes" isotopes that cannot be used as fuel in their original form. An inexact analogy is using wet wood in your fireplace. You light a fire with wet wood and get energy from it while the initially unburned wood is being dried out for use as more fuel.

There are four nuclei that are fissionable: uranium 235, plutonium 238 and 239, and uranium 233. Plutonium 238 and 239 can be bred from uranium 238, which makes up 99.3 percent of all uranium ore. There's enough U-238 available to make plutonium for centuries' worth of electricity.

Plutonium is a wonderful fuel, the most concentrated known to man. And

the breeding cycle can be set so that the plutonium is burned as fast as it is bred, so there's no excess for making bombs.

In addition to breeding plutonium from uranium 238, you can breed uranium 233 from thorium, adding still more centuries of available nuclear-electric power.

Plutonium has been called the deadliest substance known to man. The "plutonium spectre" is constantly being called up by those opposed to nuclear power. Is the substance really so dangerous?

"Spectre" is exactly the right word. Plutonium is dangerous if you breathe it, but even then, it's not as dangerous as radium, for example. If it were as toxic as some claim, we wouldn't have still with us, alive and well, 23 of the 25 peo-

of the matter were resolved, high-level nuclear wastes would first be reprocessed, with the transuranic elements separated out and recycled as fuel. The rest, a truly tiny amount of material—two cubic meters per 1,000 megawatt plant per year—would be sealed into glass (as is already being done commercially in France) and then buried in underground salt or other geologically stable formations.

Nuclear wastes are the only type of industrial waste you can completely remove from the biosphere. Nothing like Love Canal is possible. Of course, one should never say "impossible" about anything, but the escape of properly buried high-level wastes is as close to impossible as you can get.

Another point is that certain of the wastes are not wastes at all. Of course,

"The one energy source that is here, now, that is abundant —for thousands of years if we breed fuel—that is safe, reliable and for which the fuel source is domestic, is nuclear."

ple from the Manhattan [World War II A-bomb] Project who got something like 25 times the allowable lung burden of plutonium. Of the two who are dead, one died in a traffic accident, I believe, the other from something else. If plutonium were the most toxic substance in the world, we wouldn't have much to fear from poisons.

Is it true that there has been no real progress toward developing a method of safely disposing of nuclear wastes?

There is absolutely no truth to that. The fact that no method has been officially adopted and legalized in the U.S. is being misinterpreted to mean that no method is known.

It's a nonproblem. In fact, I've written a booklet called *The Non-Problem of Nuclear Wastes*. Anyway, because you get such a tiny amount of waste and because of the comparatively short toxicity period of nuclear waste, even if nuclear power had none of its other advantages, this would give it the edge over all other generating methods.

The trouble is exclusively one of politics and bureaucracy. If the politics

the uranium and plutonium taken out during reprocessing are very valuable as fuel. Something like 80 percent of their energy is still there but polluted by fission products, which are removed during reprocessing. But even some of these "pollutants" have value—for instance, rhodium, palladium and ruthenium. They are used by the ounce in refining steel and special applications. By weight, they are more valuable than gold. It's not yet economic to extract them from the wastes, but it soon will be. So one consideration is disposing of the wastes so they can be retrieved if necessary.

At the moment, nothing is being done with the used nuclear-power fuel rods, because of Carter's ban on reprocessing. They are piling up at power plants, which are running out of storage space. If they are simply buried—the so-called throwaway option—most of the energy potential will be thrown away too. More than that, we'll have "plutonium mines" all over the country. This is energy conservation and concern for the environment? Ridiculous!

You have been talking about high-

level wastes, but what about low-level wastes, which account for 99 percent of the volume and only one percent of the radioactivity of all nuclear wastes?

The majority of this stuff is from hospitals. Very little comes from the nuclear power industry, a point conveniently ignored by the opponents of nuclear power. And much of it is not even radioactive; anything that *may* have been contaminated is disposed of, just to be on the safe side.

Again, there's no technical or scientific problem, just political ones. Such wastes can be quite safely buried in shallow "graves." America's whiskey drinkers contribute as much radioactivity to the environment each year as that contained in one ton of low-level waste. And the volume of low-level waste is really not great.

When it comes to nuclear energy, the United States is lagging well behind the other industrialized countries.

Yes. In the West, the two most advanced countries are Britain and France. Both have breeders, France with one on line, feeding power into the commercial network. France is building another with a capacity of 1,250 megawatts, and it plans to have 50 percent nuclear capacity by 1985. This means one new plant on line every two months. Britain is going ahead with plans for more breeders and waste disposal, in spite of its oil finds in the North Sea.

Germany has been held up by so-called environmentalists, but it has no oil and cannot help but go nuclear. Japan, with no oil or coal of its own, is building a large nuclear capacity, including a breeder.

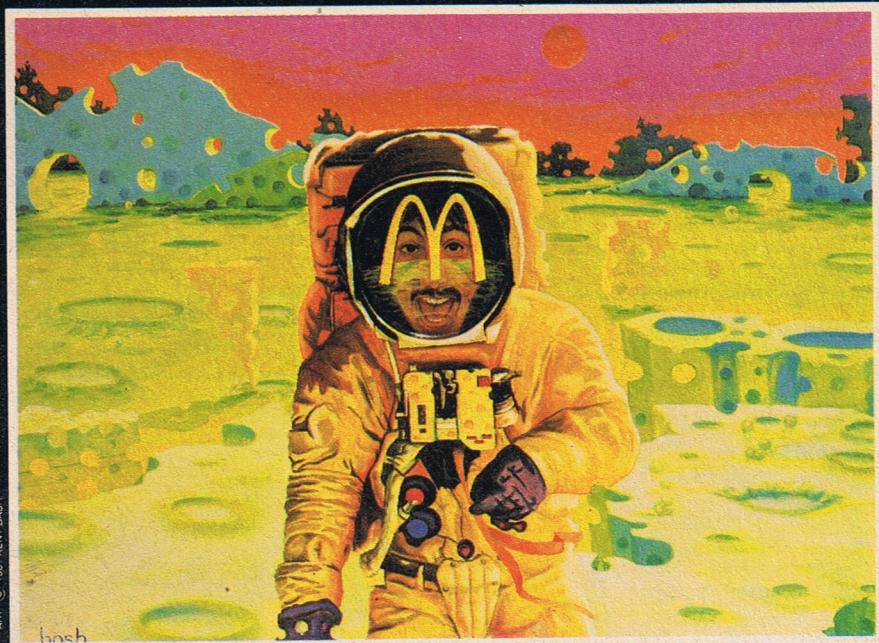
Behind the Iron Curtain, Russia is feverishly going nuclear, including breeder plants. They are not only using nuclear for electric power but also for central heating in a city. They have a reactor right downtown just to heat buildings.

But why have industrialized countries in the West been able to move so much faster than we have?

I think there are two reasons. One is that their political systems are less likely to be disrupted by a vocal minority. More important, however, is the fact that they are very short of domestic energy resources. They can't afford to play around; their backs are to the wall. We have centuries of coal and decades of oil, even if the government is keeping it in the ground. If the oil from the Middle East is cut off, the United States will suf-

(continued on page 74)

Kent Bash



ART © 1981 KENT BASH

A quick run-through of Kent Bash's art portfolio is sort of like a rush-hour drive along LA's San Bernardino Highway. From behind the steering wheel you witness myriad visions of Southern California flashing by. Bash's work borrows from the same medium, but pulls over to freeze-frame the more obtrusive sights: the glitter of celebrities; the lack-luster dreariness of everyday life; the funk of California grooviness—the fast-food generation. Yet it is the touches of fantasy that throw you; the occasional spaceship or the winged horse.

Bash is a child of the '50s and '60s, an adult of the '70s, an observer as he enters the '80s. His art may sometimes smack of cynicism, but his

wry sense of humor keeps him from drifting off the edge into pessimism. Some of his pieces may be dismissed as "pop," but Kent insists that it is just the way he sees the world. He looks at life from both the dark and bright sides, at its best and its worst, though always striving to retain a tone of promise amidst his depictions of the human conflict.

Only recently has Kent emerged into the still-unbounded world of science-fiction/fantasy artists. His entry came from an acquaintance with Harlan Ellison, for whom he illustrated a limited-edition book entitled *All the Lies That Are My Life* (a full-color version of the cover appeared on the front of the November 1980 issue of the *Magazine of Fantasy and Science*

Fiction). Since then he has shown his work at a couple of local conventions, and he may even venture out of his home state to far-away Denver for the World Con this fall. Other recent works include a cover for a book discussing the works of Steven King (Kent had to draw from many of the author's writings, ranging from *'Salem's Lot* to *Firestarter*).

As for the two pieces featured here and on the center-spread, Kent has this to say: "'Moon McMuffin' [shown on this page] was basically like the *Capricorn 1*—even though it preempted it—that maybe [the Apollo 11 Moon mission] was all done in the studios. That maybe there's really a holdout for the Moon being green cheese, and McDonalds already had it staked

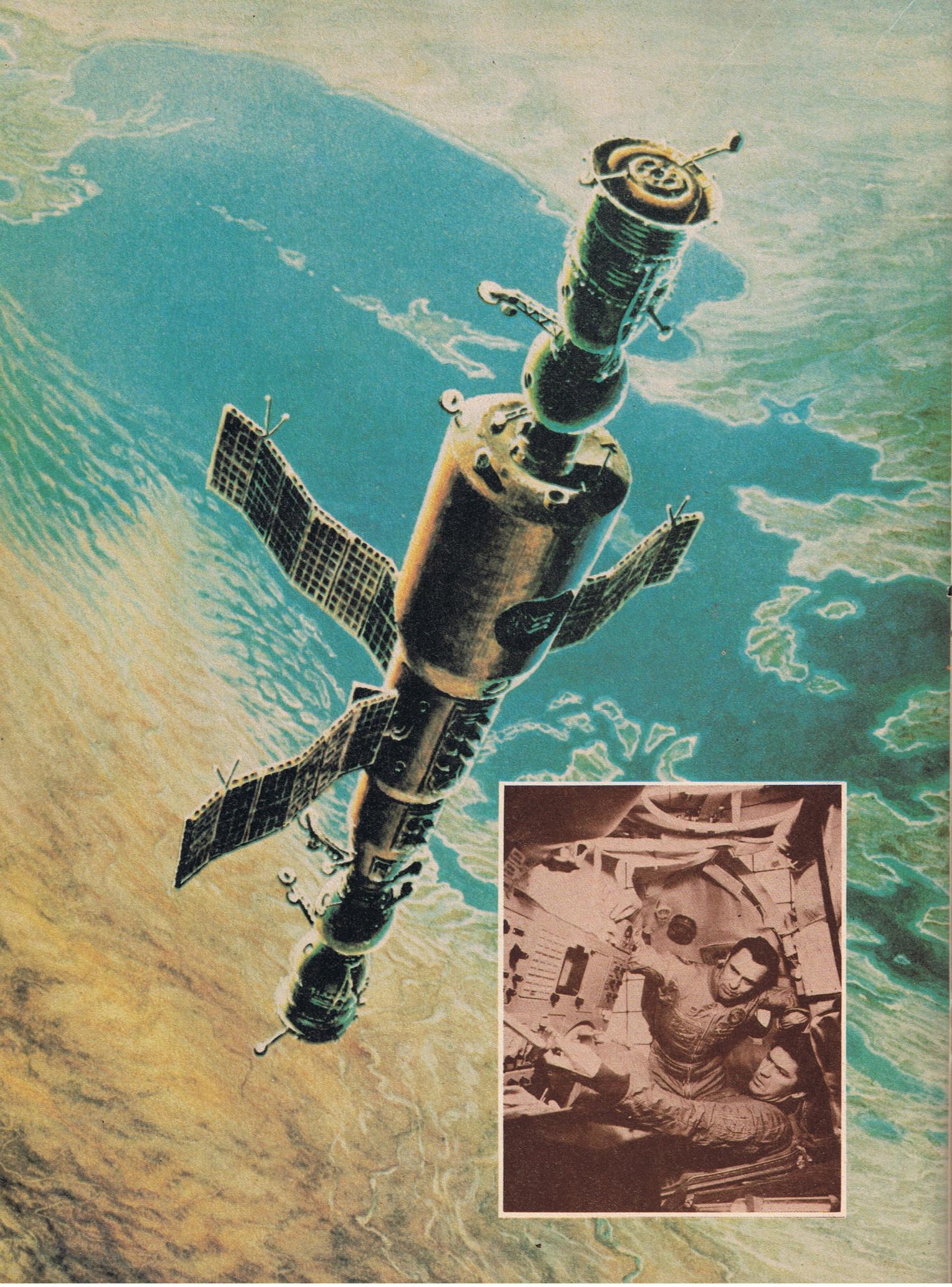
out. It's just one of those things that crossed my mind one day. I have a tendency to lean toward things that have a sense of humor to them.

"'Space Case' [the following spread] came about when I was thinking about if aliens came from another planet and discovered aliens from yet another world already here, probing through our wreckage. The second group thinks that the first group is residents of this planet, rather than being aliens as well. They are transporting a creature down to investigate... the crime. In the end, I left it up to the audience, which I think is important in artwork—to make the viewer the final element."

Okay, audience, take a look... and make yourselves the final element.







LIVING IN SPACE

The dream of putting humans in space for long periods of time is now a reality: *Skylab*, *Salyut*, the space shuttle. Therefore, it is time to take the plans for space colonization off the drawing board and put them in orbit. The prac-

ticalities of everyday living in the hostile environs of outer space require close scrutiny. In this special four-part section, *FUTURE LIFE* addresses various aspects of living in space: medical barriers; spacesuit design; an orbital base of operations; and space colonies.

MEDICAL BARRIERS IN SPACE

By JAMES E. OBERG

One antispaceflight congressman reportedly denounced the *Skylab* space-station program once in these terms: "What on Earth good can come of medical research in space? Nobody has ever died of weightlessness!"

Spaceflight doctors also have image problems with astronauts themselves, as Apollo veteran Michael Collins described in his memoir, *Carrying the Fire*: "Every pilot knows that if he walks into the doctor's office on flying status, there are only two ways he can walk out: on flying

status or grounded. Since his status can only change for the worse, why risk it? . . . The truth of the matter is that the space program would be precisely where it is today (1972) had medical participation in it been zero, or perhaps it would be even a little bit ahead."

Actually, the reality of space medicine is better than its reputation. In space it can significantly contribute to the comfort and health of human voyagers while allowing unique physiological research that can advance medical science in general. (There is even the possibility that someday hospitals in space may provide unmatchable medical care for today's hopeless cases—but that's another story.) Medical discoveries from space research—along with the equipment and technological processes developed specifically for use in space missions—can have a beneficial impact on all of us.

We've come a long way since pessimistic doctors conjured images of ghastly deaths awaiting foolish voyagers

in space: their hearts would beat wildly until their blood vessels burst; they would drown in their own vomit; their food would not pass properly through their digestive systems, and they would starve to death; they would go stark raving mad as primal terrors of falling jerked them back to bleary-eyed wakefulness the moment they dozed off to sleep. Only a few science fiction authors had faith in the ability of the human body to tolerate the unearthly forces of outer space.

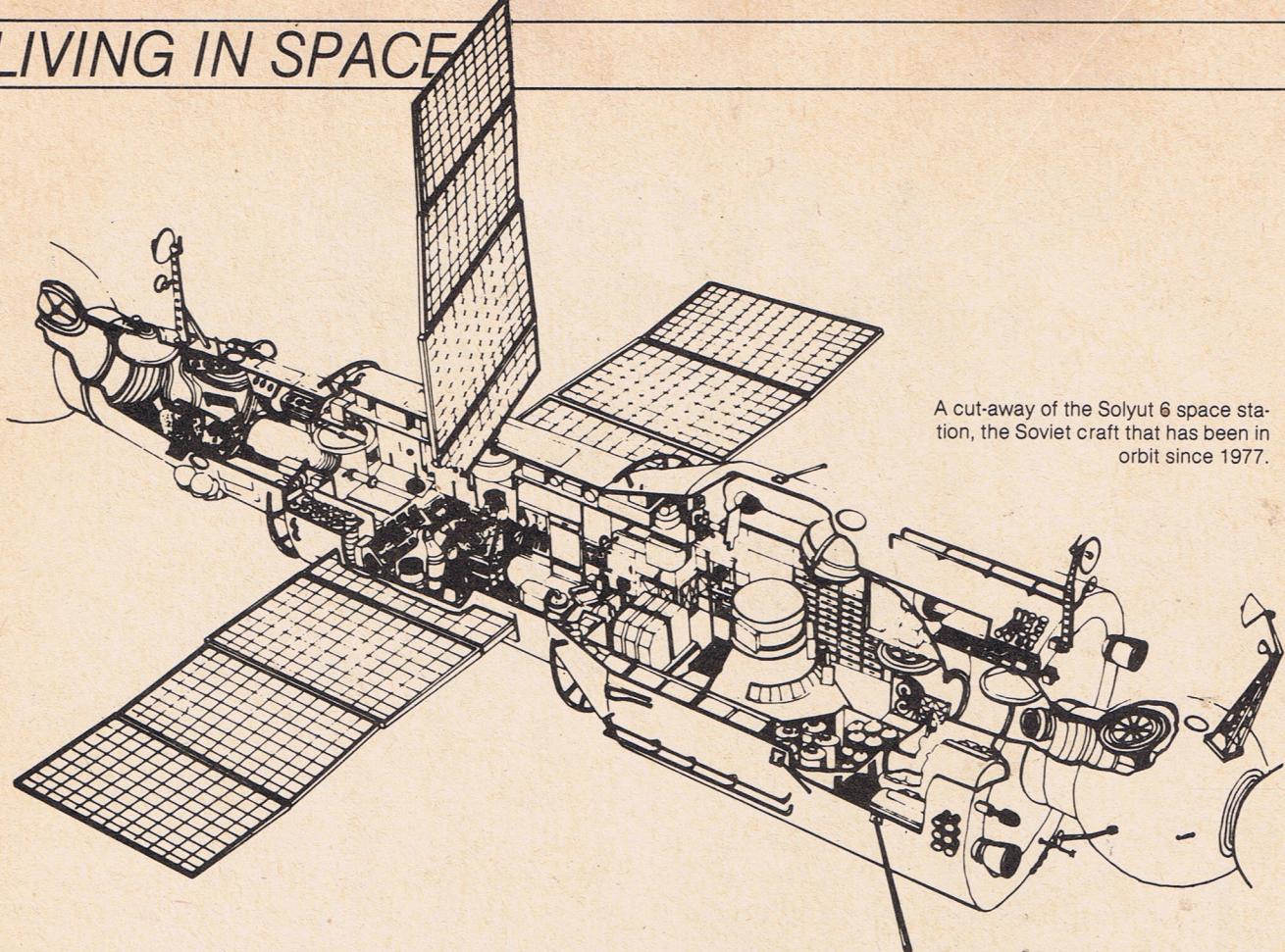
Some of that caution remains. Contemporary experts predict: over the long run human bones will turn to jelly; space conditions will so weaken the body's muscles and heart that the shock of returning to Earth will kill far-voyaging space travelers; cosmic rays will inexorably chip away at irreplaceable nerve tissue in the brains and spinal cords of Mars-bound astronauts and cosmonauts; if minds do not snap from the isolation and tension, bodies will succumb to mutant infections and metabolic imbalances.

However, the people who are actually flying in space express greater confi-

This article is reprinted from Star & Sky magazine, February 1981. © 1981 James E. Oberg.

Opposite: The Soviet's *Salyut* space station, rendered by Russian artist Andrei Sokolov. Inset: Cosmonauts Valery Ryumin and Leonid Popov spent a record 185 days aboard *Salyut 6*.

LIVING IN SPACE



A cut-away of the Salyut 6 space station, the Soviet craft that has been in orbit since 1977.

ART: COURTESY JAMES OBERG

dence. Barely heralded by the world's news media, Soviet cosmonauts have repeatedly lived in space for six months at a time, first breaking and then doubling and redoubling all American space-endurance records. Americans are preparing to exploit the orbital bridgehead soon to be established by the space shuttle, which will allow weeks-long space expeditions by dozens of scientists and engineers. The Russians, too, include short space hops in their plans—both specialists and political guest cosmonauts will be venturing into space, there to face the medical barriers that remain.

Space conditions do have definite effects on travelers. With the absence of weight, the body's fluids no longer pool in the legs but become more evenly distributed. More blood reaches the heart, where autonomous feedback systems register an excess. In response the body removes surplus fluids, which in turn drops the total blood-plasma volume, creating an overage of red blood cells. This sets off another feedback mechanism that cuts off new red-blood-cell manufacture until normal attrition reduces the blood-cell level to an apparently appropriate one. About one month into the mission, new blood cells begin to appear—but they have a structure detectably different from those manufac-

tured on Earth. After 100 days all leftover Earth-born red blood cells are gone, and only the new space-formed cells remain.

The initial redistribution of body fluids leads to a feeling of fullness in the head, or of sinus congestion. Faces become noticeably puffy, and eyes take on a decidedly Mongolian appearance. Also, this redistribution seems to interfere with the normal operations of the inner ear's two balance mechanisms—the semi-circular canals (which measure angular acceleration) and the small bone called the otolith (which measures linear acceleration). The resulting motion sickness, nausea and often vomiting pass within a few days, because the human body adapts to the new conditions.

Various preventive measures have been tried or proposed: drugs (whose effects in space are often unpredictable), preflight exercises (such as sleeping with the head lower than the torso or engaging in violent acrobatics or aircraft maneuvers), biofeedback (which seems to help, but takes weeks to learn), hypnosis, constrictive trousers and thigh cuffs to ease the headward fluid shift. Probably the oddest so far is a set of orthopedic shoes sent on a Soviet manned flight late in 1980; the theory being that pressure on the arches of the feet would fool

the autonomous nervous system into thinking it was still on Earth! No results have yet been announced.

The problem with motion sickness in a weightless environment is that the causative mechanisms are not understood. It could be the inner ear or the "eighth nerve" running to the brain or some cerebral anomaly—or something else. Since there is no obvious correlation between an individual's vulnerability to ordinary motion sickness on Earth and subsequent bouts of space nausea, there is no known way to screen candidates for their susceptibility to space sickness. This dilemma will take on greater significance in the space shuttle era when an increasing number of Earthlings will embark on short (but hopefully productive) space sorties.

Flights over 30 days in duration introduce other problems. In weightlessness the human body initiates a series of marked physiological changes—adaptive, not destructive—which mark a normal alteration in functioning intended to maintain health under new conditions.

One such long-range adjustment is skeletal decalcification. Structural minerals in bones gradually seep out and are lost through urine, while dietary calcium

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SUITING UP

By BARBARA KRASNOFF

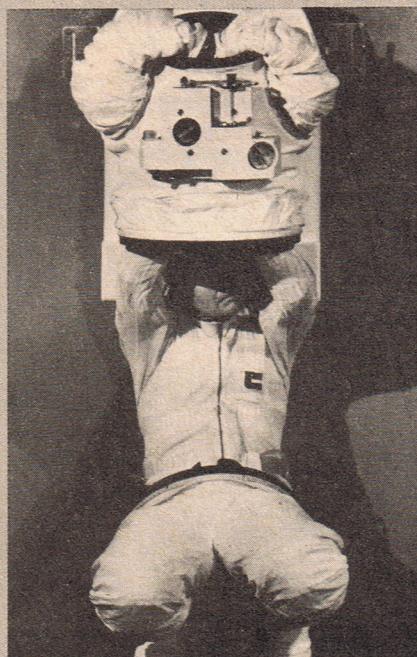
While we all like to take a stroll now and again, the process of dressing for the outdoors is somewhat more difficult for the occupants of the space shuttle. After all, they have to be protected against the extreme cold of space (not to mention a total lack of oxygen), compared to which the North Pole is a summer resort.

In the old days (ten years ago or so), astronauts were dressed much like a small child is dressed for winter. They stood around rather passively while various technicians checked this, fastened that and generally prepared their charges for the hazards of space.

Nowadays, astronauts are expected to be able to dress themselves, and the new spacesuits have been designed with that in mind. These economical models will no longer be specifically tailored for each crew member—in the case of the shuttle, where a different crew will be going up each time, that would be too expensive for financially pressed NASA. Instead, each segment of the suit comes in a variety of sizes to fit physiques ranging from petite to wrestler.

Let us suppose that one of the astronauts—perhaps Anna Fisher, pictured here—has to go outside the shuttle. Before anything else happens, she will have to wait about 12 hours before suiting up. Why? Normal air pressure inside the shuttle, for reasons of comfort, is pretty much the same as at Earth sea level—about 15 pounds per square inch. Pressure inside the suit, however, will only be about four pounds per square inch, to allow for freedom of movement (otherwise, the suit would be too rigid for easy movement). Therefore, in order to prevent a possible case of the bends (decompression sickness), the entire crew area will be depressurized somewhat before any astronaut is scheduled to leave the ship.

The suit itself comes in several parts: a hard upper torso, a lower torso, gloves, a helmet and a visor assembly that fits over the helmet (to protect the wearer from micrometeoroids and dangerous



Anna Fisher (top) and engineer suit up

the astronaut then can proceed to the main spacesuit. The flexible bottom part—the “pants” if you will—goes on first. She then eases herself up into the rigid upper section, which is temporarily affixed to the bulkhead. The two halves are attached together by means of a hard waist ring.

An extremely important and sophisticated part of the upper piece is the life-support backpack. Formerly a separate unit, the pack (or PLSS—portable life-support system) contains seven hours of oxygen for breathing, suit pressurization and ventilation; an extra half-hour emergency supply of oxygen; controls for cooling and circulating the water in the undergarment; controls for regulating and purifying the atmosphere inside the suit; and a microprocessor. This last small item is in itself a fairly vital piece of equipment—it checks out and monitors the system's vital functions, provides start-up instructions, and alerts and informs the wearer if something goes wrong. The information is relayed to the astronaut via a module attached to the suit's chest which contains a series of controls and an easily seen LED display.

Once all this is secure, the astronaut attaches the helmet, a simple bubble-shaped affair. Underneath, she is wearing what is called a “Snoopy Cap,” which contains headphones and a microphone for communications and warning signals.

The space traveler will then draw on her gloves (which are thin enough to allow her to pick up items the size of a dime), pressurize, detach the suit from the bulkhead, and—voila!—she is ready to venture outside.

By the way, those of our readers who are dreaming of becoming passengers aboard a future shuttle flight, and who are now picturing themselves suited up in the above attire, may have to modify their dreams somewhat. The spacesuits are only for the crew. In the case of an emergency, passengers will be provided with a personal rescue system (PRS)—an inflatable, 34-inch-diameter sphere in which a single person can sit until rescued. In the case of, say, sudden depressurization, the inmate of the PRS will receive life-support functions and communications through an “umbilical cord” extending from the sphere. However, if worst should come to worst, the PRS contains a portable oxygen system good for one hour while you wait for the rescue shuttle to (hopefully) arrive.

PHOTOS COURTESY HAMILTON STANDARD/UNITED TECHNOLOGIES

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is not metabolized properly and passes through the digestive system unabsorbed. On Skylab visits in 1973 and 1974, astronauts registered proportionately greater losses of bone calcium on each longer flight—to the tune of two percent a month. If continued, this loss rate could lead to bone breakage and collapse upon return to Earth after a year and a half in space.

In the early 1970s some space doctors naturally assumed that the loss would continue at the same rate beyond the three-month maximum experienced on Skylab. Here at last was a biological bogeyman that could vindicate the oft-disproved pessimists. But the pessimists were wrong again. Long Soviet voyages in 1978, 1979 and 1980 demonstrated that after a few months the initially high decalcification rate slows down as the body approaches its adaptation level. Cosmonauts lost six percent in the first three months, but only three percent in the next three months. The assumption

is that the loss might go up by another percentage point or two over the following six months and then level off. That hypothesis will be tested in 1981-82 during a Soviet manned orbital expedition lasting at least a year.

Even if the decalcification levels are too high, new drugs are being tested to counteract the metabolic anomalies that led to the initial calcium loss. One NASA-sponsored study at the San Francisco VA Hospital used injured skiers as test subjects in a bed-rest study. (Strictly horizontal bed rest is an excellent simulation of weightlessness.) Over a three- to four-month period, certain drugs (dichloromethane-diphosphonate was the main one) completely curtailed decalcification in about one-third of the patients.

But even if the adaptive processes are benign in space, one fundamental difficulty remains. The space voyagers must eventually return to Earth, where a process of readaptation will begin. If their

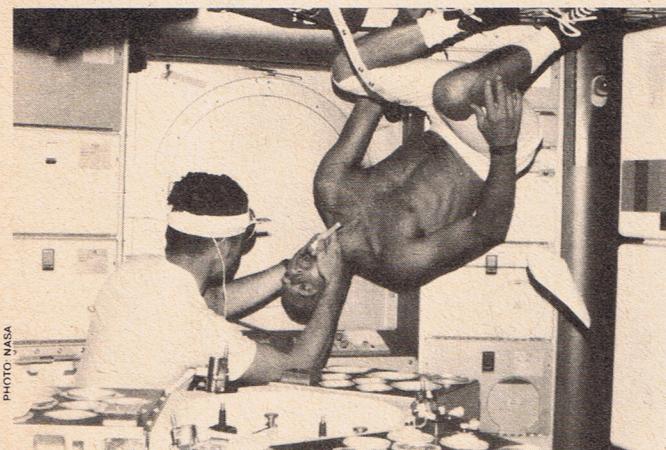
bodies are fully adapted to a stressless space environment, conditions on Earth may prove more hazardous to their health than the actual spaceflight. Decalcified bones may shatter; a relaxed cardio-vascular system may fail; a weakened immune system may succumb to massive infection. Spaceflight would not kill the astronauts...Earth might.

To forestall this grim possibility, spacefarers must deliberately resist the natural processes of physical acclimatization to space. They must overstress their hearts and muscles daily by engaging in hours of exercise (for the cosmonauts aboard Salyut 6, this was equivalent to climbing the stairs of a 200-story building every day). Tight elastic straps in clothing continually counteract the tendency for muscles to return to the fetal position. Drugs, and periodic visits from new cosmonauts who carry low-level infections, stress the body's immune system.

After expeditions of six months cosmonauts have maintained sufficient cardiovascular and muscle tone to make the return transition to Earth with remarkable ease and speed. Such methods seem useful for flights of at least a year; however, some optimistic Soviet space officials envision weightless sojourns lasting *three* years—more than enough for a round trip to Mars.

But without careful attention to the medical problems of both short and long spaceflights, the exploration of space will be more difficult and more dangerous than it need be. Doctors, however misguided in their past predictions, are vital, and a Pollyannaish assertion that there are *no* limits to human endurance in space is not borne out by the facts either. Since half a dozen space doctors have become astronauts themselves (only one has flown so far), there's bound to be better understanding and cooperation between the previously inimical groups.

Meanwhile, it's hard to imagine that a U.S. congressman isn't capable of seeing that a better understanding of human physiology *can* help human health care in general—especially when stressed in novel ways and when exhibiting new tell-tale clues to internal mechanisms. In this field, as in others, serendipity works. Basic research or goal-oriented studies have a predictable (or unforeseeable) way of delivering discoveries even more valuable than those originally sought. Space medicine is on the verge of fulfilling that pattern.



Left: Onboard Skylab 2, Dr. Joe Kerwin gives an oral exam to mission commander Charles Conrad Jr. This shot was taken in weightlessness by pilot Paul Weitz.

Below: Skylab 3 science pilot Owen Garriott sits at the Apollo Telescope Mount console. This mission kept three astronauts in space for 59 days.

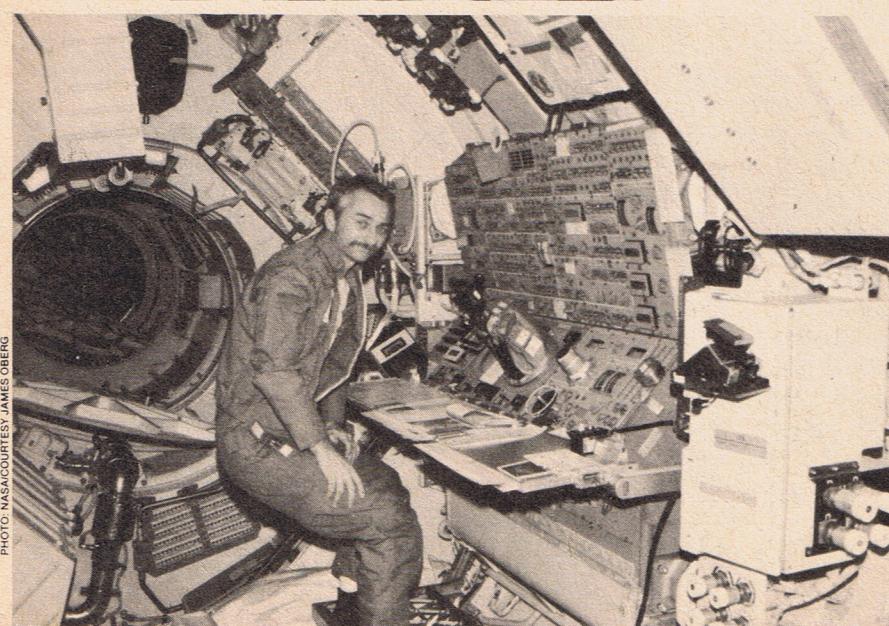


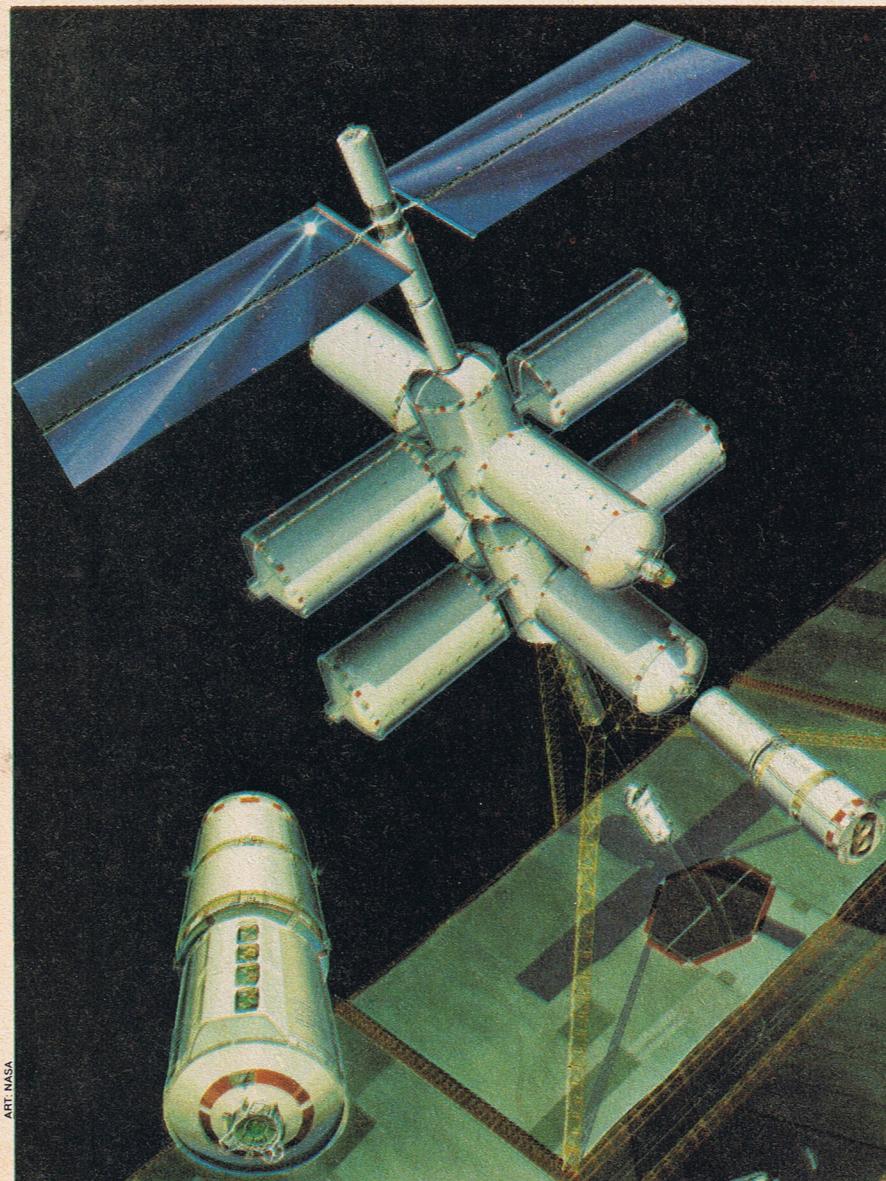
PHOTO: NASA

PHOTO: NASA/COURTESY JAMES OBERG

SPACE OPERATIONS CENTER

NASA engineers have plans for a manned space station that will serve as an orbital base of operations.

By ROBERT STRAHAN



The Space Operations Center will serve as a base for space activities in the future.

It is no secret to *FUTURE LIFE* readers that the post-Apollo years haven't been kind to NASA. An apathetic public has allowed shortsighted Congresses to cut the space agency's budget time and again, to where NASA now carries out infrequent, underfunded projects, with only the hope of the space shuttle to keep alive the spirit that pushed us to the Moon. In official Washington, there are no plans at present for any manned projects beyond the shuttle. This current political environment had left NASA in such a state that it had no concrete post-shuttle plan.

But this has changed. NASA planners have now worked out a definite goal that will not only entrench humanity more firmly in outer space, but will pave the way for ever-expanding projects. The proposal calls for the construction of a permanent manned space station, the Space Operations Center.

The Space Operations Center, or SOC, is a radical departure from previous space station designs as far as its primary functions are concerned. Such past designs emphasized experimentation and pure science. The problem with this approach, believes Clarke Covington, head of the System Design Office at the Johnson Space Center in Houston and one of the engineers of the SOC, is that scientists followed conflicting interests. One experiment would require something at the expense of something else that was the brainchild of another scientist. The SOC will still carry out experiments, but it will mainly be a functional center. In Covington's words, it will be up there to "do the job." Its title

LIVING IN SPACE

says it all: It is to be an orbital base of operations.

Ponder for a few minutes what that implies, and you begin to see just how important this concept could be. Unlike more recent NASA missions, the SOC is more than an end in itself. It is a means, an element in a new grand strategy for NASA. At first, the SOC is to be a near-space facility operating in LEO (low Earth orbit, approximately 100-200 miles up), as in the case of Skylab. By agency thinking, this is the most practical next step into space, since a near-space facility wouldn't require as many technological leaps as, say, a station in far higher GEO, or geosynchronous Earth orbit, some thousands of miles up. The knowledge gained from the SOC, however, could *lead* to other such complex structures. This is the potential inherent in the project. NASA envisions it as the first rung on a ladder to far greater projects. As Mercury led to Gemini, which led to Apollo, so is the SOC intended to become the control

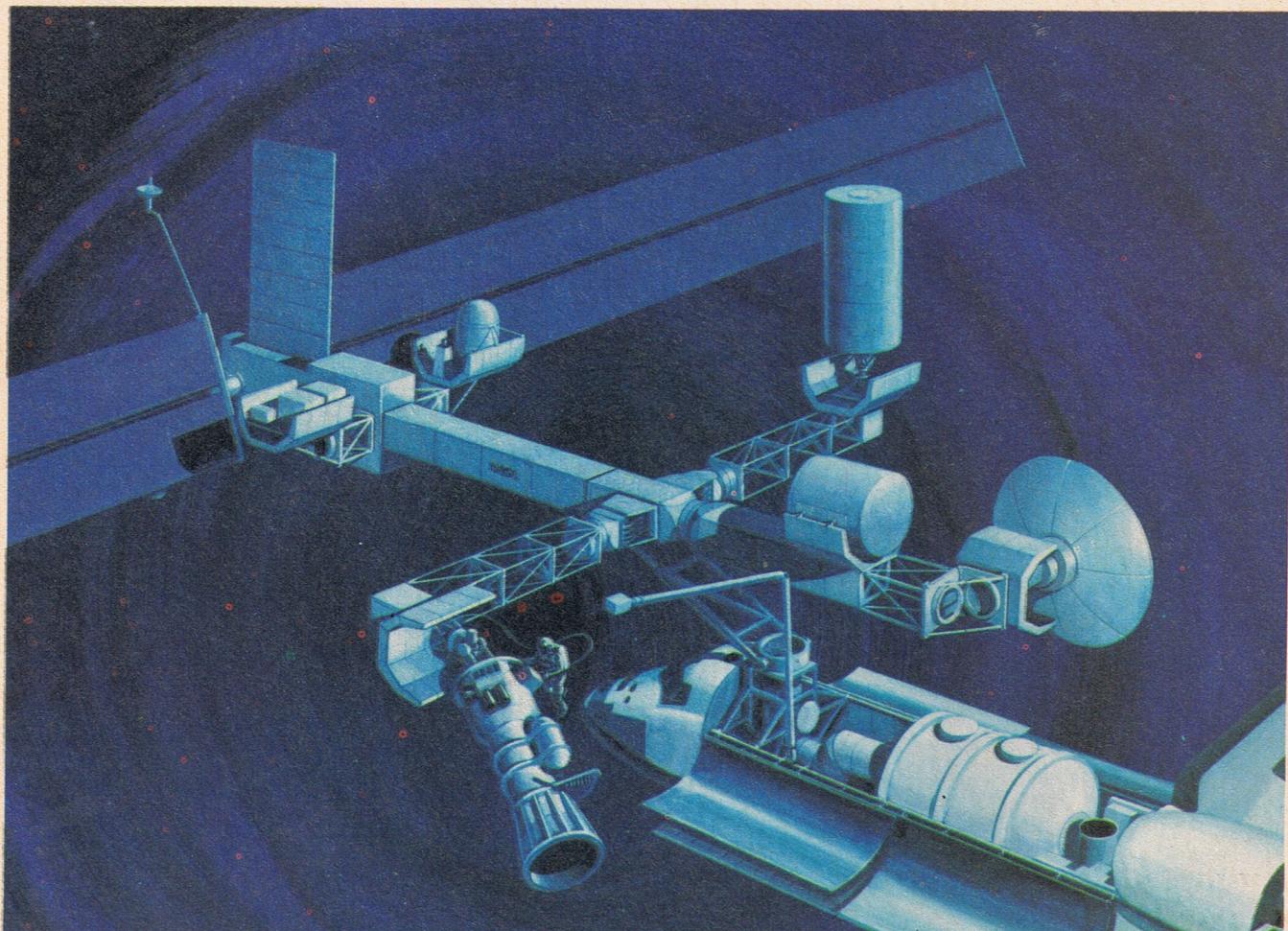
center of efforts that will lead to other space stations. These will include stations in both LEO and GEO, and later huge facilities in GEO and beyond, such as the kilometers-long Solar Power Satellite. The SOC could even be the forefather of space habitats or lunar colonies. As NASA public relations official Dave Alter says, "There's never been a long-range plan like this."

What follows are the details of the project as it now exists on the drawing boards at the Johnson Space Center. But keep in mind that these are based on studies to date, and that later studies could change different stages of the project. For example, questions have been raised as to whether or not it's best to use automation for zero-construction, or if it would be wiser to have astronauts work on EVAs (extra-vehicular activity). At present, NASA is leaning toward automation, but data from any number of tests could change this. The SOC is at least eight to nine years down the road, and much can happen during that time.

Indeed, ten years ago, one design for the shuttle had it looking like a bullet with wings.

The SOC will operate with two main objectives: 1) to reduce orbital missions' dependence on ground-based control, or, in other words, to put the bosses closer to where the action is; and 2) to become a way station, a transportation system from LEO to GEO, where most of NASA's future operations will take place. With these objectives in mind, let's look closer at each.

From watching network TV coverage of any space mission, you'll remember the countless shots of Mission Control, with its dozens of technicians sitting in front of their monitors, and keeping tabs on every aspect of the mission. In the future, the picture, if there is one, will be a little different. Mission Control will be a cramped cubicle with maybe two technicians calling the shots. Though it will not replace Mission Control entirely, the SOC will take over most of the jobs, becoming a space traffic control. The SOC



This artist's conception by McDonnell Douglas shows the inner core of the SOC power module as it is being assembled by the shuttle.

PHOTO: © 1981 MCDONNELL DOUGLAS

A university professor, with the aid of colleagues and students, designed and built a model space station.

D

DESIGNING FOR SPACE

By BARBARA KRASNOFF

Everything's going to change once we get off the planet," asserts architect and industrial designer Bob Schimel. "Everything."

To prove his point, with the aid of colleagues and students, he recently designed and constructed a three-dimensional model of his conception of a future space colony. The model, inspired by the ideas of Gerard O'Neill, is meant to illustrate the evolving needs of a space-bound humanity.

In fact, the catalyst that started Schimel on his project was a visit by O'Neill himself to Kent State University, where Schimel teaches. "Gerard O'Neill came up with about three or four different physical forms that space colonies could take," he says. "Some of them could be cylinders, another could be a sphere, another one could be a doughnut shape. . . . And then when I called his office and talked to him he said that all the others proved that some of them have disadvantages over the others, but that the Bernal Sphere—the one with two cylinders on both sides of a sphere—was the one that most scientists would agree would have the most benefits once humanity chose to go in that direction."

However, Schimel's ideas of what the future will hold for humanity in space is a little different from the usual energy-and-industry projections. He feels that humans have an almost biological urge to leave the planet's surface, and states that, "Free space should prove to be the

transition in the return to an evolutionary species finely integrated with its survival mechanisms."

As a reflection of this, his version of the Bernal space station would be stocked by a variety of strange new facilities. Schimel conducts a short tour of the colony:

"Entrance into the colony starts at the ends of the central tubes where several functions would be located. Extraterrestrial communications receivers and senders, vehicular docking, launch facilities, industrial assembly areas and transport system stations are at these extremities. As you proceed into the interior through the entry tube, you pass the space industries manufacturing research and development areas, waste recycling and food processing in the larger outer cylinders. The transport system which accommodates your passage is self-propelled levitation. Energy distribution and colony communications technologies run the entire length of the entry tube.

"The interior of the central sphere accommodates living quarters, transport shuttle components, research facilities and a spacious 360-degree domed environment. Hibernation units have numerous levels where people can rest and take advantage of the psychic energy rejuvenation in the Psionic structures. An advanced state of astro-spirituality is experienced in chambers specially suited for the evolution of expand-

ed consciousness. . . . The development of living environments shall include the generation of psychic energy through Psionic generators as major structures. The harnessing, measurement and utilization of psychic energy shall prove to be a major breakthrough. . . . comparable to the discovery of atomic power."

The model itself is made of more down-to-Earth stuff. "The model is four feet in diameter and about 13 feet long," Schimel explains. "It's made of plexiglass, blown glass (I had to use a glass blower to do some of the strange forms for the Psionic generators and the consciousness envelopes), metal, wood, plastic and cotton." Cotton? "That's supposed to simulate a kind of ethereal atmosphere for the consciousness envelopes.

"Regardless of the form the colonies are going to take," Schimel concludes, "there's a certain phase that they'll go through, a human phase where we will have dogs and cats and animals and agriculture and industry, and even the law. . . . It might not be for 20 years. I don't know. But once we get into the space colonies, and we see that the agriculture and the industry and everything else that we took for granted on this planet doesn't work up there, things are going to change. And what has become magic or esoteric on this planet is going to become science up there, or be accepted more."

"I really believe that. No kidding."

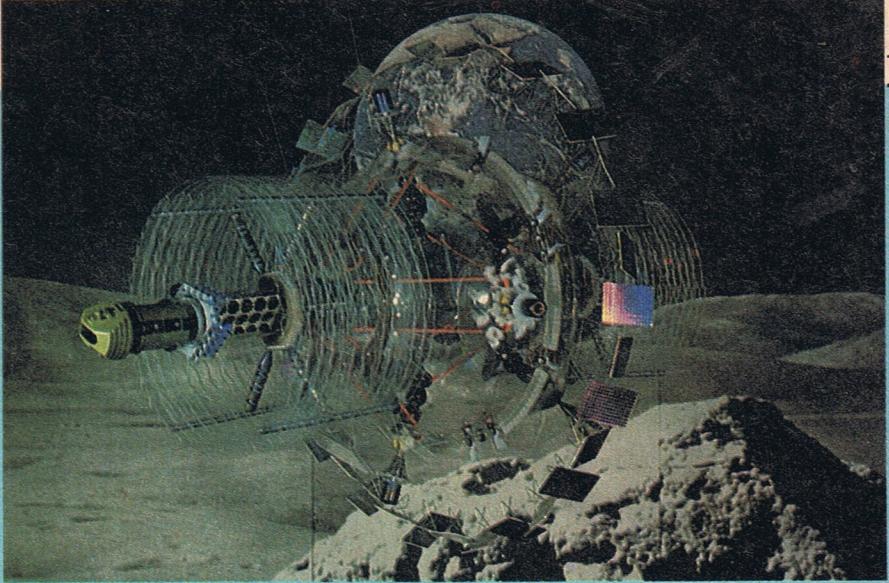


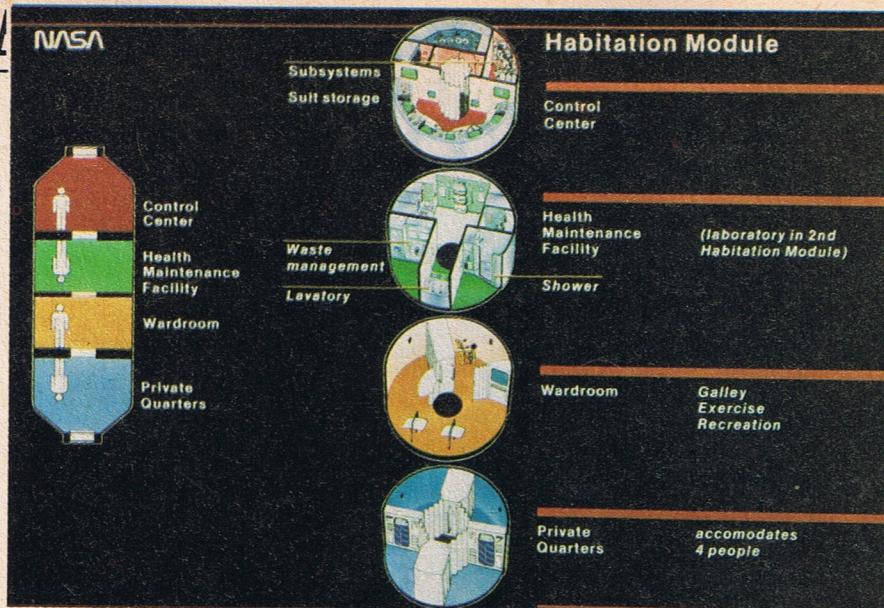
PHOTO COURTESY BOB SCHIMEL

LIVING IN SPACE

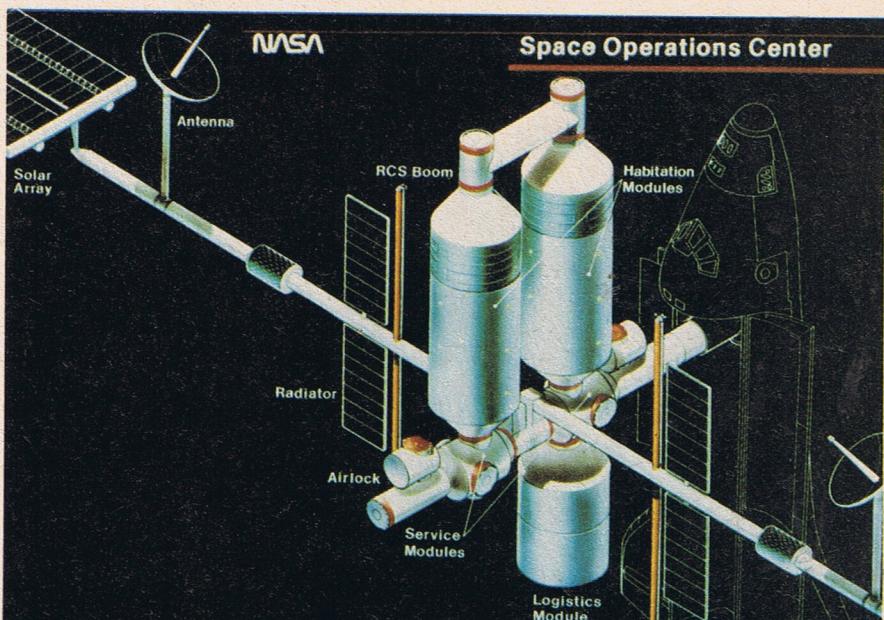
will monitor almost all LEO missions, and many in GEO, perhaps leaving ground control to concentrate on special missions such as new lunar landings. Another purpose of the SOC will be to operate as an extraterrestrial "service station," virtually eliminating the need for malfunctioning equipment to be returned to Earth. If a satellite develops a problem, the shuttle or some other vehicle could pick it up, take it to the SOC to be repaired and return it. Repair work could be done in either of two ways: If the satellite has a pressurizable volume, it could be linked to an airlock and opened up; if not, it could be done by an EVA. Routine maintenance using the same methods could also prolong the lives of our orbiting hardware. Manned craft would also be serviced. The SOC could handle major repairs with the aid of a strongback, a platform the needy vehicle could be locked onto like a dry dock, and a manipulator arm similar to the shuttle's. In relation to space safety, think of the advantages an in-orbit facility would provide in case of emergency.

We can, and have, put many satellites into GEO without help from a station. But it is expensive and wasteful in terms of what it takes to get something there (boosters, fuel, etc.). NASA accountants cringe at the potential cost of sending building materials directly to GEO. The SOC would be a far cheaper and more efficient way of getting them there. It takes less power to achieve LEO and then be ferried up to GEO than to get there by making a straight shot from Earth. A shuttle, or other craft, would bring up the GEO-bound cargo. The SOC could then refuel the craft, or transfer the cargo to another vehicle, such as a proposed "taxi," which would only make LEO to GEO runs. Another possible application of the SOC is to rendezvous with and add boosters to space-craft going beyond GEO and into deep space.

Unfortunately, in appearance the SOC is not as romantic as the wheel-based structures of George Pal's *The Conquest of Space* or Stanley Kubrick's *2001*, but NASA is more interested in function than esthetics. Besides, it won't be rotating to create artificial gravity—Skylab proved astronauts can work efficiently in weightlessness. Its shape is determined in part by the size of the shuttle's cargo bay, where it will be fitted in sections for the trip, and in part by how it is to be put together once it's in orbit.



The Habitation Module of the Space Operations Center: a very compact living space, with facilities for experimentation.



The Space Operations Center will be carefully planned to provide the best use of our first orbiting space facility.

Each piece will be maneuvered into place, latched and sealed by the shuttle's RMS (remote manipulator system), a 15-meter robot arm. There will be little need for EVA, as plans now stand. Nor does the SOC's design relegate the station to a predetermined size. Its configuration is flexible, and modules or other structures could be added as need required.

In the beginning years, though, its setup will just consist of the fundamentals. Two service modules will comprise the core of the station, together providing the foundation on which the rest will be built, and therefore they will be taken up first. The main airlocks and docking port would be located on this section. Next would come the two 40 x 14 foot

habitation modules, the living and working quarters for the eight-member crew. For the most part the two modules would be identical. One would be designated the main operations center, the other the backup, and either one would be able to sustain the crew for up to 90 days. The only difference between the two would be their second floors. In one module it would be the Health Maintenance Facility, equipped to handle all medical needs and situations up to and including minor surgery (though one NASA official confides that they would really prefer not to attempt any zero-surgery until they know far more about space medicine). The other module's second floor would be a general laboratory. Overall, the SOC's interiors are

based on lessons learned from Skylab.

Extending from the service modules would be two solar arrays, designed to supply most of the station's power. A backup power system, energized by either a nickel/hydrogen battery or a regenerative fuel cell, would only be needed when the station's orbit carried it into darkness, away from the sun's rays. Each solar array would have a communications antenna, a radiator to expel excess heat and an RCS (reaction control system) boom. The boom would contain small thrusters by which the SOC would control its altitude, enabling it to adjust its orbit as needed, or to change orbits to rendezvous with craft from Earth or from GEO. The SOC will have 90 days worth of orbital propellant, plus another 90-day emergency supply.

Perhaps one of the most revolutionary aspects of the SOC is its life-support setup. Different systems in the works would combine to create an almost perfect closed-circle ecology. For instance, Vapor Compression Distillation (VCD) is a process that would recycle metabolic water from within the station by captur-

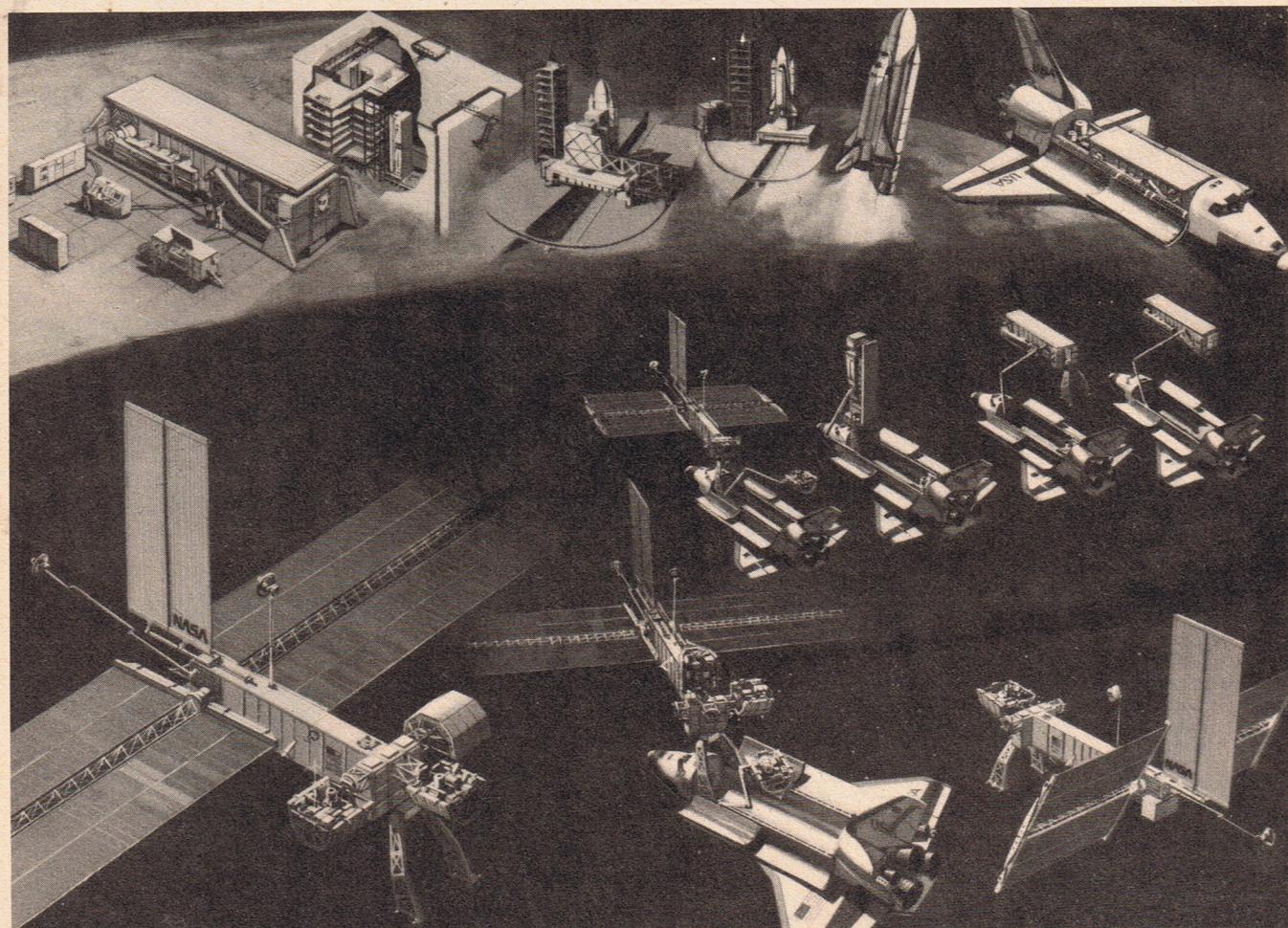
ing the humidity in the air which comes from the crew's breath or sweat (at present, there are no plans for a system to recover water from urine, as has usually been talked about). Another system being tested now would reverse the VCD process by breaking water down and extracting the released oxygen. To deal with the problem of carbon dioxide disposal, past missions have had to rely on lithium hydroxide canisters, which periodically need replacement. The SOC contains a new device, capable of CO₂ disposal without the need of replacement canisters, called the Sabatier Reactor System. As it now stands, the SOC would only need to be resupplied with oxygen (for the little still lost in the VCD process), hydrazine and food.

For many, the SOC is the perfect continuation of the space effort after the shuttle. The question is: Will Congress see this? Will they appropriate the billions of dollars needed for funding? Though NASA officials such as Robert Frosch, outgoing administrator of the agency, and Christopher Kraft Jr., head of the Johnson Space Center, have gone

on record as supporting the SOC, will the lawmakers buy it?

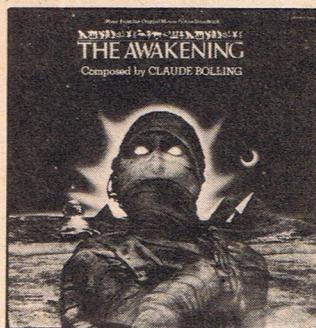
NASA planners admit that now is not the time to push the idea. Too many Congressmen are upset over the shuttle's delays. It's pretty well accepted within the organization that the shuttle must prove itself before talk of any new projects can begin. But when the time does come, some think NASA might try to sell the SOC as a necessity rather than a scientific curiosity item. "What will the state of the nation be like in 1990?" asks NASA publicist Dave Alter. "What will our needs be?" It could turn out, some believe, that by then the nation may need what NASA has to offer. They site the energy situation and Soviet advances in space as examples of things the space agency might be able to help deal with.

The upcoming shuttle program could usher in a new era of U.S. space activity. But the Space Operations Center could mean far more. It could bring on an age of permanent human occupation of space. Furthermore, this station, and the strategy behind it, will make it just that much harder to turn back. ■



A possible sequence of events for the construction of the SOC using the space shuttle.

SOUNDTRACK SPECTACULAR



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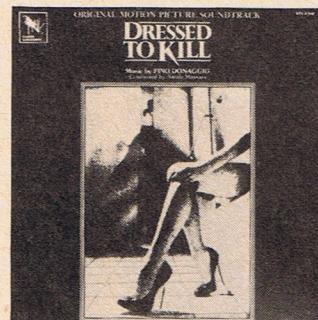
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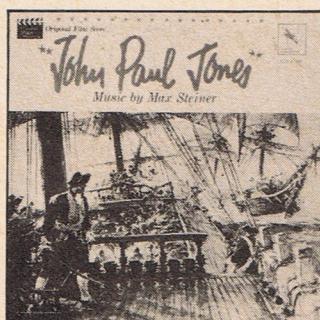
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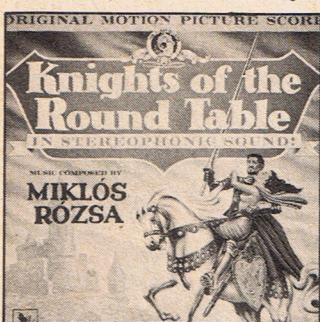
JOHN PAUL JONES

Composer Max Steiner conducts thrilling adventure score.



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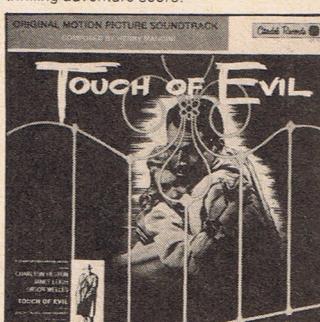
KNIGHTS OF THE ROUND TABLE

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SAMSON AND DELILAH

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TOUCH OF EVIL

Joseph Gershenson conducts thriller music by Henry Mancini.



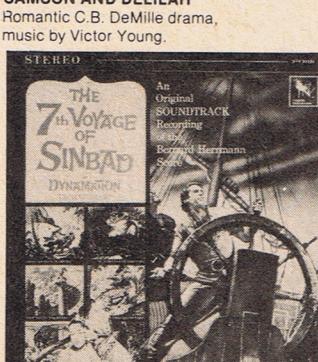
CAPTAIN HORATIO HORNBLOWER

Robert Farnon conducts his score for adventure/sea epic.



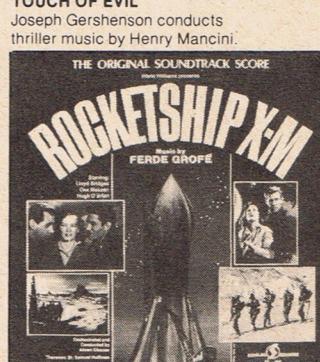
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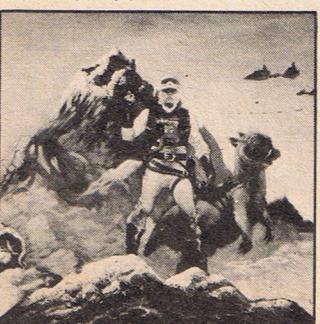
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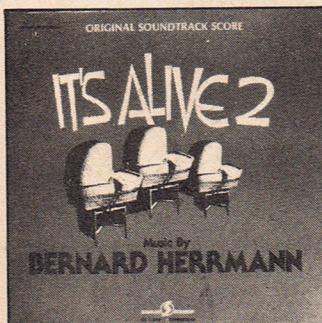
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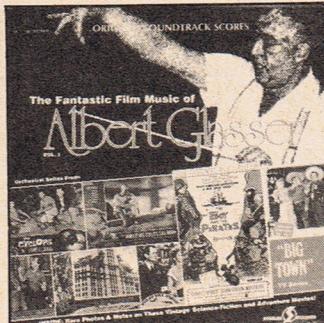
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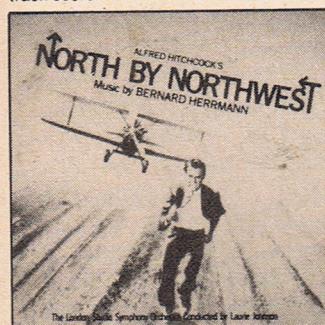
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To use a linguistic analogy: The synthesizer can be thought of as the unique individual who can not only speak all languages accent-free, but also flawlessly mimic any accent he wishes to. Kind of like Sid Caesar with a photographic memory.

Paralleling the world-wide synthmania epidemic of the last quarter century was the rise of rock 'n' roll. Also a product of the post-WWII cultural mutation, rock—with its primitive, rhythmic sensuality and simple, catchy melodies—was, and still is, able to leap tall national/ethnic barricades in a single bound. The meta-language of rock speaks to the young everywhere, regardless of the verbiage they're accustomed to communicating with. In its frenetic beat pulses the metallic throb of the machine age, and in its overpowering assault, the disorientation and frustrated urgency induced by life in the modern world. It is both an expression and a release of those feelings, a potent union of expositive and purgative. At the musical intersection where synthesizer technology and the rock sensibility collide, much of today's most vital music takes life.

Ironically, it has predominantly been those who filter American music through non-American esthetics who appear to have any inkling of this poten-

tial vitality. This sad condition isn't a particularly new one, either—it happened before with jazz, the British Invasion transformation of rock in 1964, and the German fusion of rock with the avant-garde in the first half of the '70s (groups like Can, Faust and Kraftwerk). We seem incapable of recognizing it by ourselves, as though some sort of alien perspective is required to show us pathetic Yanks the real value of what we've done. We're always the last to catch on. And recently there has been an interesting wind blowing in from the East, bringing with it the Yellow Magic Orchestra from Japan.

While Haruomi Hosono (bass, synthesizers), Ryuichi Sakamoto (synths), and Yukihiro Takahashi (drums, percussion-synth) formed YMO in 1978 with the stated purpose of creating

Some sort of alien perspective is required to show us pathetic Yanks the real value of what we've done.

something new and innovative, their music is on the surface not at all adventurous. To the ear, it is a skillful synthesis of elements drawn from a broad spectrum of American pop—soul music, disco and pop-rock. Qualitatively, words that describe it include: pleasing to the ear, polite, sometimes saccharine, infectious, clean, unchallenging. YMO's songs are quite successful as perfectly innocuous pop music—some might say Muzak—but there is a broader intent clearly at work beneath the surface. This becomes more evident when one understands the cultural context in which they exist.

In typically Japanese fashion, the YMO has ingested a Western product, examined it, and then assembled a duplicate that is cleaner and more efficient than the original. Their technical mastery is displayed throughout their second American release, *X∞ Multiples* (A&M SP-4813), in the subtlety of tonalities and variety of textures they've synthesized. But virtuosity, like their choice of a readily accessible format, isn't an

end in itself, only a means to other, more ambitious goals.

"We believe in the power of music—not language," Takahashi told me through an interpreter in a recent interview. In Hosono's words, YMO's music is metamorphosed into a "metallic concept meant to massage the frontal lobes." Furthermore, "I feel that we and our time intermesh. Even good music has no relevance if it isn't set in a contemporary context. YMO is a very effective channel for action. The machine is our tool. We have to use it to develop the human imagination and the power that's hidden in all of us."

Running through much of what the three say about YMO's music, there is the idea of music as a force for positive change, without preaching any dogma. Sakamoto says, "Music in the 1980s will be a random mixture of a whole range of influences, not just American. The decade will be strong on anxiety feelings, even approaching the apocalyptic. Music will work as a cleansing filter to dissolve distorted dissatisfactions." Adds Takahashi, "There's going to be a drastic cultural change in the near future, and our music is a bridge to connect us with what's coming next."

Just as faint traces of Japanese scales leak into songs like "Rydeen" and "Multiples," so does an intertwining thread of traditional Oriental disciplines join much of the band's forward-looking philosophy. It's evident in their implacability in the face of change, their disciplined, stoic acceptance. To them, Tokyo is "Technopolis," a crowded, energy-rich city whose inhabitants function almost like the flow of electrons in a microchip; maintaining their individual identity by the artful cultivation of style and visual image (Takahashi is a successful clothes designer). Topmost, though, is a pride in personal achievement, and a hard-working pursuit of functional efficiency. The band-members themselves seem ambivalent about the importance of Eastern influence in what they do. According to Takahashi, "We know the Japanese influence exists subconsciously, but the ones we are aware of—in terms of music and lifestyle—are American. We belong to the generation born after the War, and we experienced



Yellow Magic Orchestra

PHOTO: A&M RECORDS

a great flood of information from the United States. That affected us the most. We can't really separate and analyze our traditional Japanese influences. Though, naturally our viewpoint is shaped just by the fact that we think in Japanese." Hosono, a devout Buddhist, agrees that the influence is primarily subliminal. "Oriental philosophy is important to me, but not intellectually. Rather, I feel it in my blood. Every Japanese has this tendency, I guess, but not everyone's aware of it. In YMO, our bodies know oriental wisdom. Not western-style dualism, but leaving contradictions as they are. That's YMO."

Recordings

Lots of worthwhile records of synthesizer music popping up recently, from some of the strangest places, too. San Francisco, for instance, which gives us the first album by the Units, *Digital Stimulation* (415 Records, A-0003; write: P.O. Box 14563, San Francisco, CA 94114). Like YMO, the Units are a trio of two synths and a drum kit, but they don't seem that interested in exploring the technical capabilities of the instrument. Excepting for moments in "Tight Fit" and "Cowboy," their utilization of the synthesizer is rather unimaginative (one handling bass/rhythm lines, the other the melody—much as two guitars would). The songs are pretty much straightforward rock in structure and format, while the lyrics display humor and an adult, futuristic awareness. Breaks no new ground artistically, but the album is quite enjoyable and marks

the Units as a bunch to keep tabs on. Also worthy of support is this small, ground-level label working hard to showcase local talent. Either write to the address above or tell your retailer to.

Down the road a piece is Ralph Records, home of the Residents (see FUTURE LIFE #19) among others. Recently released is the stunningly excellent debut LP by Swiss trio Yello, *Solid Pleasure* (Ralph YL-8059-L; write: Ralph Records, The Cryptic Corporation, 444 Grove St., San Francisco, CA 94102). This record comes totally out of nowhere, and immediately establishes Yello as one of the premiere synthi bands of the world. These guys never for a moment stand still—one minute they're funkering it up in "Bimbo," a respectable Stevie Wonder pastiche, and the next they're shaking maracas, skipping down the aisle with a basket of fruit on their heads and doing the "Downtown Samba"! Not to mention moments of eerie, Gregorian chants, impressionistic sound painting and the kitschy lunacy of "Banananas to the Beat." *Solid Pleasure* is a superb balance of accessibility, experimentation and plain good taste. And by the way, the Residents' latest, *The Residents Commercial Album* (Ralph RZ-8052-L), containing 40 one-minute toe-tappers, is no slouch, either. Again, write to the above address (for the wonderful Ralph "Buy Or Die" Catalog—no one markets product like the amiable zanies at Ralph), or get on your local record store's case.

Residing across the continent in our nation's capital is Mars Everywhere, an

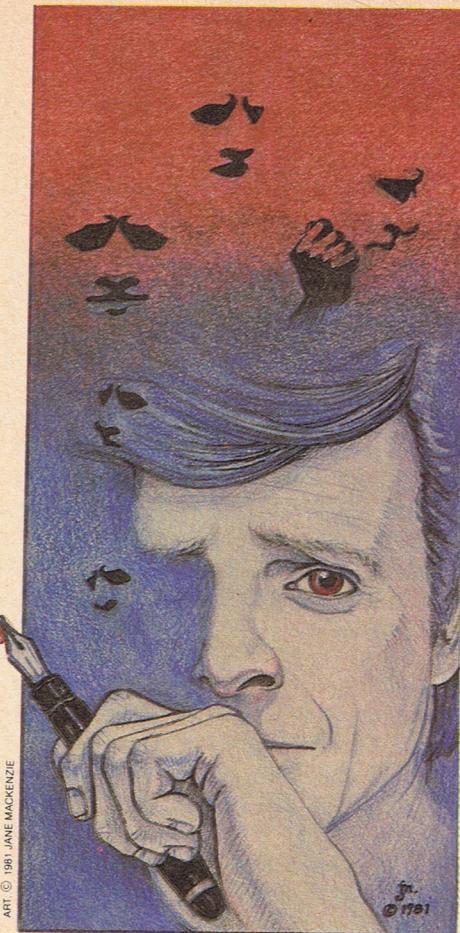
ambitiously experimental group with their first LP, *Industrial Sabotage*, out on the Random Radar label (RRR 008; write: Random Radar, P.O. Box 6007, Silver Spring, MD 20906). Though there are some rhythmically strong, rocking sections, Mars Everywhere tends more toward audio-visual collage work. More demanding of the listener, but very rewarding, *Industrial Sabotage* evokes imaginary landscapes in the mind's eye. Mars Everywhere uses electronics skillfully interwoven with Ernie Falcone's darting guitar work and Greg Yaskovich's liquid bass. At times I'm reminded of Weather Report in their less-funky moments, and at others of some '50s SF movie soundtracks (there's a great bit with the "Twilight Zone" theme). Special commendation for scientific awareness and a knack for translating the abstractions of space into sound. Same ordering procedure as the other.

Jumping across the pond to Europe, we find Frenchman Richard Pinhas' latest release, *East West* (Pulse 003, UK import, available in the U.S. through Jem Importers). A good, stylistically varied album of electronic rock and pure electronics, *East West* features a guest appearance by SF writer Norman Spinrad, singing unrecognizably through a vocoder (on a song he co-wrote with Pinhas). Pinhas continues to grow outward from his beginnings as a Robert Fripp-influenced guitarist, languidly tape-looping himself into the stratosphere. This is a recommended purchase on an interesting new label (upcoming is a release by David Vorhaus, one of the unknown geniuses of the synthesizer, called *Re-Entry*).

References

Those of you interested in finding out more about keeping up with/confirming your good taste in the area of electronics or avant-garde rock are advised to check out *The Rock Yearbook 1981* (Virgin/Delilah Books, \$11.95), which along with its coverage of the expected, does a damn good job with the outer fringes of things as well. Thorough summary of what happened last year, with a list of the more noteworthy electronic albums released (you can ignore some of the mongoloid opinions, though, but that's par for the course). Memorize this book and no one will ever kick sand in your ears again.

AN EDGE IN MY VOICE



Because *this* demon doesn't pull in its dripping fangs. It will take on television networks, major industries, the organized church and even the United States government. So when the ka-ka hits the collander, we will soon see if the magazine in which these columns can be found is ready to go up against the direct lineal descendants of Torquemada, Cotton Mather, Senator Joseph McCarthy, Josef Goebbels and the House Un-American Activities Committee: those who would censor and legislate and boycott every opinion that doesn't conform with their own repressive, provincial, reactionary and downright antideluvian perceptions of the universe.

All of which they do in the name of Motherhood, Apple Pie, Bleeding Christ and The American Way.

Which makes it hard to fight them. Because as soon as you try, they start screaming Degenerate or Commie or Antichrist or Perverter of the Minds of Children.

And so it should definitely be in genre, don't you think? This frontal assault on those who want to pull *Catcher in the Rye* from public libraries, it ought to deal with science and the future and like that... right?

Glad you agree, chums.

Because we wish to start the festivities with one lovely aspect of The Moral Majority's crusade against reason. It is called creationism. As opposed to the theory of evolution. You remember all that stuff, don't you? The Scopes Monkey Trial and such good jazz. You thought that was all settled in the film *Inherit the Wind*, did you? You thought Spencer Tracy had won the day for Darwin and the descent of species.

Wrong, and wrong.

Which leads me to introduce to you, in this corner, a nifty little scrapper for sanity named George Olshevsky; and over there in that corner a small group headed by Duane T. Gish, Gary E. Parker and a shadowy legion of slavering, slope-browed, prognathous-jawed atavists who were apparently bitten by a 35 mm print of *One Million B.C.*, who believe that men and dinosaurs

Up to now, I've been playing with kids. Assailing the nonspecific targets of irrationality and obscurantism in my view. And apart from the deranged mercenary who wrote me today telling me that he had survived the Nam, Angola and Rhodesia wars (ostensibly he gets his kicks opening up with an M-16 at little brown babies) and that I didn't know what honor and patriotism were all about, I haven't had too much angst thrust upon me by these columns. But all that is done. Here and now I take on the big demon. Beginning with this column, my friends, I declare myself at arms against The Moral Majority.

And now we will find out how deeply runs the stream of courage you and I have perceived in the publishing and editorial staff of FUTURE LIFE (and by extension, STARLOG).

I said to someone the other day that if I were to take them on, I'd damned well better pay off the mortgage on my house, because if they choose they can unleash a million letters to my sponsors, saying they'll never again buy this or that product if I'm permitted to go on raging with all this evil and immoral rot, and then I couldn't make a buck, and that would mean I couldn't make the mortgage payments on Ellison Wonderland, and would lose the house and find myself out in the street... as happened to so many people during the blacklist days of the '50s. I also said I'd have to find sponsors who were beyond the vengeance of The Moral Majority. The few that occurred to me—and you might suggest a few others, friends, one never knows when the hard times will hit—were *Playboy* and the manufacturers of toilet paper. Or the phone company.

But, after all, we are writing a column for FUTURE LIFE, not for *The Nation*.

lived at
the same time.

But... enough from me. I turn the column over now to a replay of letters and newspaper clippings from last January. I wish you well on this deranged journey, and I'll be back next issue to make some comments.

Oh, and by the way: don't show this column to your local creationist. It'll only make him/her fwow up his/her cookies.

Dear Mr. Ellison:

Last month the San Diego *Evening Tribune* carried an item on creationists which carried statements by one Duane T. Gish, creationist, in response to comments at the recent AAAS symposium held in Toronto. I couldn't take that bullshit being printed in a newspaper without a proper rebuttal, so I duly composed one and sent it off to their editorial page. Lo and behold, they printed it in full and I felt vindicated. Then a week later, they printed a letter from Gary E. Parker,

which tries suavely and rather articulately to put down the points I made in my own letter. Unfortunately, Parker is full of it, despite his professorship and Ph.D. (professor at Christian Heritage College?? Give me a break!), but his writing is good enough that the average reader could be swayed into believing that creationism is actually a defendable hypothesis, and that I, who have studied evolutionary theory for some time and purposely kept things simple and clear in my original letter, actually don't know what I'm talking about. So I wrote a second letter pulling out a few creationist quotations from their own books (actually, a children's book by Gish) for the world to see. I had had enough of evolutionary scientists constantly being forced to defend their work against the irrational onslaught of the creationists and had decided to carry the attack into their own camp a bit.

Well, the damned *Tribune* just sent me a note which reads in full as follows:

"Thank you for your letter to the editor, replying to the reply of Dr. Gary E. Parker to your original letter, which we printed on January 24.

"This is a controversy which is not likely to be settled in our lifetimes, certainly not in the letters column of this newspaper. We do not wish to prolong the dialogue at this extraordinary length. Each side would desire the last word.

"Your letter is so interesting, however, that I have taken the liberty of forwarding it directly to Dr. Parker. I hope this meets with your approval.

"Sincerely, Ralph B. Bennett, Chief Editorial Writer."

First of all, as far as scientists are concerned, there is no controversy and whatever controversy there was was settled back when Huxley and Wilberforce battled it out. The current flap has been raised by fundamentalists for arcane reasons of their own, not because any scientists worth their reputations give credence to creationist ideas. Second, by giving the creationists last word, he makes it Creationists 2, George Olshevsky 1—a clear win in their favor; he could certainly have cut the debate after my second letter. Then we would both have had equal time, if nothing else. Third, forwarding the letter to Parker won't convert him; Parker will just file it. In fact, the creationists could even send a few

goons to my place (the address was on the letter—a requirement for publication by the *Tribune*) to throw rocks; those kind are not known for their subtlety of thought. I sent a postcard to Bennett expressing some of these thoughts, but I don't think it will do much good.

My question is, faced with this situation, what would you do? You have some experience dealing with these types, and any advice you could offer would be appreciated. I'll even drop the subject entirely, if that's what you recommend.

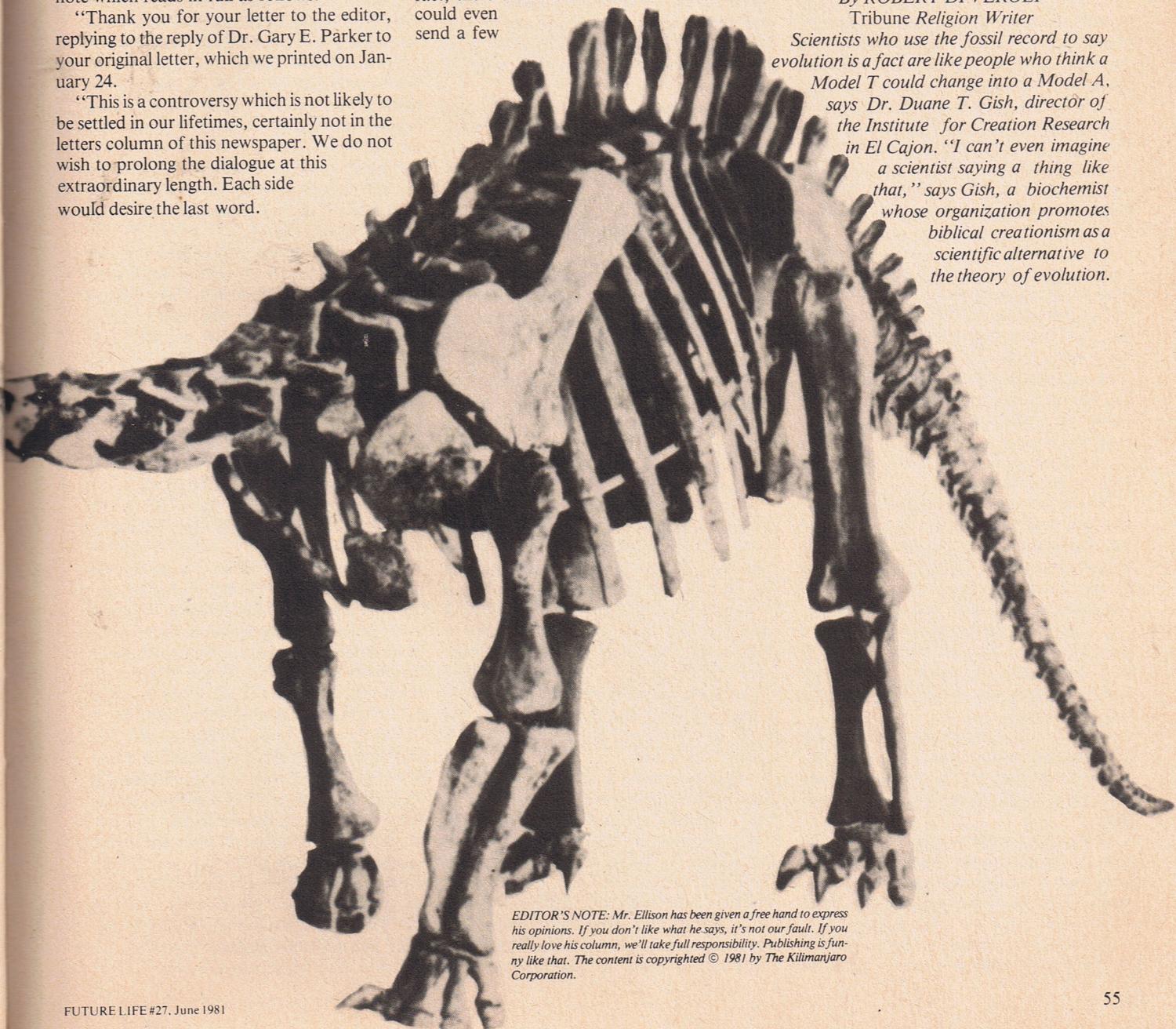
George Olshevsky
San Diego, CA

From the San Diego Evening Tribune, Saturday, Jan. 10, 1981:

Creationist denies fossil's use as proof of evolution

*By ROBERT DI VEROLI
Tribune Religion Writer*

Scientists who use the fossil record to say evolution is a fact are like people who think a Model T could change into a Model A, says Dr. Duane T. Gish, director of the Institute for Creation Research in El Cajon. "I can't even imagine a scientist saying a thing like that," says Gish, a biochemist whose organization promotes biblical creationism as a scientific alternative to the theory of evolution.



EDITOR'S NOTE: Mr. Ellison has been given a free hand to express his opinions. If you don't like what he says, it's not our fault. If you really love his column, we'll take full responsibility. Publishing is funny like that. The content is copyrighted © 1981 by The Kilimanjaro Corporation.

It was Dr. Porter M. Kier, former director of the National Museum of Natural History in Washington, D.C., who said this week that "evolution is a fact," because of "overwhelming and incontrovertible" evidence furnished by the fossil record.

"There are more than 100 million fossils in museums over the world, all identified and dated. That's 100 million facts that prove evolution without any doubts whatsoever," Kier told the American Association for the Advancement of Science in Toronto.

"The fact is that among all those fossils, not one intermediate or transitional form demanded by the theory of evolution has been found," Gish said in an interview.

These transitional forms, or series of missing links between one kind of animal and another, should be lying around everywhere, but in fact are nowhere to be found, Gish added.

"All these fossils are just that—records of animals that once existed, but they give no evidence of one kind of animal changing into another as the theory of evolution demands," he said.

"It's just like going to a museum where you see a buggy, a Model T Ford, a Model A Ford, a V-8 Ford and a modern Ford. They're all different kinds of Fords. You can assume that one model changed into the other, but there's no intermediate forms to prove it.

"The proof of evolution and what evolutionists have looked for ever since Darwin are these intermediate forms between one kind of animal and another. They themselves have said their theory demands them, but they've never found them."

Many confirmed evolutionists such as Dr. Stephen Jay Gould of Harvard and Dr. Karl Popper of England are saying they must develop a new theory of evolution precisely because these transitional forms have never been found, Gish said.

He said one alternative evolutionists have discussed is the theory that one kind of animal "rather abruptly"—on a geological time scale—changed into another without going through the intermediate, transitional stages that could show up eons later as fossils.

"In other words, they're admitting there is no evidence in the fossil record for the gradual change of one creature into another demanded by the Darwinian theory of evolution," Gish said.

"That's something we creation scientists have been saying for years. Now some very prominent paleontologists, evolutionists and other scientists are saying precisely the same thing.

"This actually amounts to an abandonment of the Darwinian theory because the Darwinian idea was that change was slow and gradual and due to natural selection. Now evolutionists are saying that's not so."

Gish said that more and more evolutionists are admitting evolution does not fulfill the

criteria of a scientific theory, agreeing with Popper that while science rests on observation, the process of evolution cannot be observed.

"No scientist has ever observed the origin of life or the evolution of anything," Gish said. "It's something you accept as a matter of faith, not fact. Actually, the fossil record supports creation, not evolution, but we don't see either one taking place, of course.

"Neither creation nor evolution can be tested in the manner required by a scientific theory. That's why it's unscientific to say evolution is a fact. That's strictly a statement of faith."

Gish said those who accuse creationists of basing their views on religious faith are thus basing their own views on an act of faith, not on fact.

"Neither creationism nor evolutionism is a valid scientific theory," he said. "When they talk about their evolutionary theories on the origin of the universe or the origin of life they are operating outside the limits of empirical science. They are in the realm of metaphysics, not science.

"We just believe in presenting both sides and letting the students decide for themselves."

From The San Diego Evening Tribune Saturday, January 24, 1981.

Report from creationist under attack

Editor: Looking through the stack of *Evening Tribunes* that has accumulated while I was out of town, I came across an item titled, "Creationist denies fossil's use as proof of evolution," by Robert Di Veroli, on page A-7 of the Jan. 10, 1981 issue. Di Veroli reports comments by Dr. Duane T. Gish on the theory of evolution, in response to the assertion by Dr. Porter M. Kier that "evolution is a fact" backed up by "evidence furnished by the fossil record."

As reported therein, Gish's comments are complete garbage. He seems quite ignorant of the entire fields of biology, geology and paleontology. Were it not for the alarming fact that the influence of creationists shows signs of seeping into legitimate science textbooks and classrooms, and thence into the minds of children still too young to distinguish truth from rubbish, I would not waste my time writing. I write in the hope that what I say will at least see print and be presented to the public as a reasoned alternative to Gish's reported statements.

—Gish is reported as saying, "The fact is that among all those fossils, not one intermediate or transitional form demanded by the theory of evolution has been found." This is utterly false. It would be false if even one transitional form were known, but it so happens that practically every fossil ever found can be regarded as intermediate or transitional between earlier and later forms. The details of just what is meant by "intermediate" and

"transitional" are subject to proper scientific debate, and it is here that the creationists try to drive their wedge.

As examples of "transitional forms," I can cite the entire fossil records of horses, elephants, rhinoceroses and humans. I can cite *Archaeopteryx*, a form perfectly transitional between dinosaurs and birds. I can cite *Presbyornis*, a recently discovered fossil bird transitional between ducks and long-legged shorebirds. And I can refer the reader to numerous texts describing countless others. Gish further is reported as stating, "These transitional forms... should be lying around everywhere, but in fact are nowhere to be found." The transitional forms are lying around everywhere; Gish seems to lack the wit and perception to see them.

—Gish is reported as saying, "Many confirmed evolutionists such as Dr. Stephen Jay Gould of Harvard and Dr. Karl Popper of England are saying they must develop a new theory of evolution precisely because these transitional forms have never been found."

Further, Gish notes, "In other words, they're admitting there is no evidence in the fossil record for the gradual change of one creature into another demanded by the Darwinian theory of evolution." When Darwin published his theory in 1859, the fossil record was still far too sparse for scientists to decide on the details and mechanisms of the causes of evolutionary change.

Now, after 122 years of collecting fossils from all over the world, scientists are in a far better position to determine why species change into other species. Darwin's principal discovery, that species have changed into others over the course of geological time, is the fact of evolution. For various reasons, not all scientific, these changes were thought to have taken place gradually and slowly.

The accumulation of evidence in the fossil record now requires a serious look toward revising this "gradualism" and replacing it with "punctuationalism." This states that species change quickly and abruptly, not gradually, into other forms.

The idea of evolutionary change itself is not questioned; only the rate of change is being examined. Gish's statements as reported in the article are designed to mislead readers into thinking that scientists want to abandon the theory of evolution for the "theory" of creationism. I cannot think of any assertion that would be further from the truth.

—Gish observes that, "No scientist has ever observed the origin of life or the evolution of anything. It's something you accept as a matter of faith, not fact." I would like to know how Gish can expect scientists to project themselves 3½ billion years into the past to observe a process which took several hundreds of millions of years to occur. Obviously no scientist has ever observed the origin of life! That does not mean that it did not take place, and that certainly doesn't mean that we can never understand the process.

No scientist has ever seen an atomic nucleus, but we nevertheless have atomic bombs. No scientist has ever seen an electromagnetic field, but we nevertheless have radio and television. For that matter, I have never seen Gish, but I think that his existence is a fact, based on the evidence of his photograph in the *Tribune*.

Just because a process is too slow to be perceived over the very short span of recorded history does not mean that we cannot infer its existence in ways that make sense. We are presented with a panorama of life on Earth extending backwards in time to its very beginnings, a panorama presenting science with patterns from which inferences can be made. One inference, biological evolution, is supported by countless data from the natural sciences. It is no longer something to be taken on faith, as it may have been in 1859, but a fact the acknowledgment of which is necessary for further progress in biology, paleontology, biochemistry, biophysics, immunology and medicine to take place.

—Gish is reported as saying, “Neither creation nor evolution can be tested in the manner required by a scientific theory. That’s why it’s unscientific to say evolution is a fact.” Gish is correct when he asserts that creation is not a theory; but he is incorrect when he asserts the same about evolution. A theory is a logical structure built up in a consistent manner by inference from a body of facts. A theory, to have any scientific value, must specify tests of itself, that is, make predictions that can be verified. For example, the theory of evolution predicts that the fossil record will be progressive in time, because species changes build on one another. You cannot have a wing without first having an arm; you cannot have an arm without first having a front foot; and you cannot have a front foot without first having a fin. The theory of evolution predicts that fins will come before feet, feet will come before arms, and arms will come before wings.

This is exactly what is observed in the fossil record when the transitional forms between fishes and birds are lined up in chronological sequence. I have never seen a statement of the “theory” of creationism anywhere—I think because no such thing exists—but the few disconnected scraps I have assimilated lead me to believe that creationism would predict the appearance of species in the fossil record completely at random, with no visible relationship to one another.

Six-legged gizmokes would be just as likely as housecats, and we could have birds in the Devonian period just as easily as we could have them in the Cenozoic. Yet nothing like this exists. The fossil record is orderly and systematic.

Creationism is not the correct description of the way things happen in real life. There is no earthly reason to present creationism as a scientific theory to young people, who have a hard enough time with science already with-



PHOTO: UNITED ARTISTS

In *Inherit the Wind*, the battle for evolution was won—or so we thought.

out this added pseudoscientific baggage.

George Olshevsky

Member

Society of Vertebrate Paleontology

Linda Vista

From San Diego Evening Tribune, Saturday, Jan. 31, 1981

Evolution-creation debate in full cry

Editor: In his lengthy letter (VOP, 1-24-81), George Olshevsky attempted to defend evolution against the creationist statements of Dr. Duane T. Gish reported earlier. As one who taught evolution in my college biology classes for several years, I can sympathize with Olshevsky’s intentions, but unfortunately, the points he raises are sufficiently out of date and error-laden to embarrass contemporary evolutionists.

As examples of “transitional forms” (“missing links” supposed to show how evolution occurred), Olshevsky cites horses, humans and Archaeopteryx (a “reptile-bird”). These are the same examples I used long ago with my college classes—the same examples that creationists like Dr. Gish have used in winning debates with noted evolutionists at major universities across the country!

Practically every fossil discovery once heralded as a transition from some animal to man, for example, has been discarded. Neanderthals are now known to be people (*Homo sapiens*), some of whom suffered bone diseases. Piltdown (*Eoanthropus*) and Java Man (*Homo erectus*) are also hoaxes. Nebraska Man (*Hesperopithecus*) was reconstructed, flesh, hair and family, from a single tooth—the tooth of an extinct pig!

Only the African australopithecines, such as “Lucy,” remain as possible links to man. But, according to USC’s Charles Oxnard, these forms did not walk in the human manner, and human types (e.g., the Kanapoi hominid) precede man in the fossil sequence, which means these forms could not have been man’s ancestor.

The “reptile-bird,” *Archaeopteryx*, was the

“missing link” discovery I preferred to use with my class. It had teeth, claws and a tail like a reptile, yet it had wings and feathers like a bird—“a form perfectly transitional between dinosaurs and birds,” Olshevsky says. And that’s what I thought, until some astute students pointed out that *Archaeopteryx* had completely developed feathers and the fully functional furcula (“wishbone”) and wings of a strong flyer—and no hint of how scales might have evolved into feathers, or legs into wings. Furthermore, bones of typical birds have been found as far down in the geologic sequence as those of *Archaeopteryx*, so *Archaeopteryx* specimens we have obviously could not have been the ancestors of those birds.

Conceding that *Archaeopteryx* is no transitional form, Yale’s Ostrom proposes that the real “missing link” between reptiles and birds is “pro-avis,” a form supposed to show how scales and arms evolved through a flapping, insect-catching stage before becoming the true feathers and wings of *Archaeopteryx* (American Scientist, Jan./Feb. 1979). However, Ostrom also states quite clearly: “No fossil evidence of any pro-avis exists. It is a purely hypothetical pre-bird, but one which must surely have existed.”

Now I have to admit to my classes that such a statement is pure faith, “blind faith” at that. Although Ostrom is a first-rate scientist, his view is not scientific; it cannot be inferred from the fossil evidence, since none exists.

Olshevsky concedes that evolution may have been taken on faith in 1859. Indeed, Darwin recognized the absence of intermediate varieties and the presence of complex and diverse life forms in the lowest known fossil-bearing rocks as “perhaps the most obvious and serious objection which can be urged against the theory.” Olshevsky’s assertion that later discoveries gave substance to Darwin’s hope is woefully at odds with the evidence, including my own doctoral work in paleontology and extensive fossil collection, and with the cutting edge of contemporary evolutionary thought. As the Field Museum’s David Raup puts it:

(continued on page 64)

A Grand Tour of the Solar System

FUTURE LIFE's Space Art Advisor Ron Miller and Astronomer William K. Hartmann have designed a spectacular tour of our solar system. Climb aboard the U.S.S. Bonestell and prepare for a fantastic voyage.

By BOB WOODS

Welcome to the *Grand Tour*. Travelers should be aware, as you embark on this journey, that this will not be a typical tour to, say, the Grand Canyon or the Everglades. At 0900 hours you will board the U.S.S. Bonestell, a sleek starship that will take you on a trip far from these terrestrial confines and off into the mysterious environs of outer space. You will visit the nine planets that comprise our solar system. You will also hover close to the curious moons, satellites and other celestial bodies that have fascinated every Earthling who ever stared into the night sky. You will witness hurricanes so enormous that Earth itself could be lost in one; a volcano whose caldera could fit the state of Missouri and whose height is greater than Mt. Everest; a world made of solid ice, smoother (in scale) than a billiard ball.

Thus might read a promotion for the fantastic tour designed by space artist Ron Miller and astronomer William K. Hartmann, who together have packaged *The Grand Tour: A Traveler's Guide to the Solar System* (Workman Publishing, 192 pages, \$9.95 paper, \$19.95 cloth). With the aid of Miller's paintbrush, satellite cameras and other visual support, *The Grand Tour* provides a novel, "you-are-there," eye-boggling experience. Hartmann's graphic descriptions of the formation and evolution of each world, from its geology to the chemical ingredients of its atmosphere (if it has one), compliments the optical elements of the voyage. What the traveler comes away with is not only a dazzling perspective of our planetary neighborhood, but a comfortable knowledge of our uni-

verse and an understanding never before available in such an enjoyable, non-threatening mode.

And who better to guide us on an excursion of such proportions than Ron Miller, whose name is not only known as Space Art Advisor for this magazine but also as one of the leading astronomical painters in—well—the solar system. His collaborator, William Hartmann, holds similar stature as an astronomer at the Planetary Science Institute in Arizona, where he is the resident expert on the origin and evolution of the planets.

The notion for *The Grand Tour* had been running through Miller's head for about eight years before he finally pitched it to Hartmann in February of 1980. After some thoughtful deliberation, the scientist concurred, "Why not?" Eventually Miller and his brother, Tom (who designed the finished product), put together four sample spreads and brought them to Ian Summers, a literary agent who specializes in science fiction/fact and fantasy projects. Miller himself had earlier taken his idea to Warner Books, but the editors there felt it didn't fit into their present product line. Workman, on the other hand, grabbed it right away.

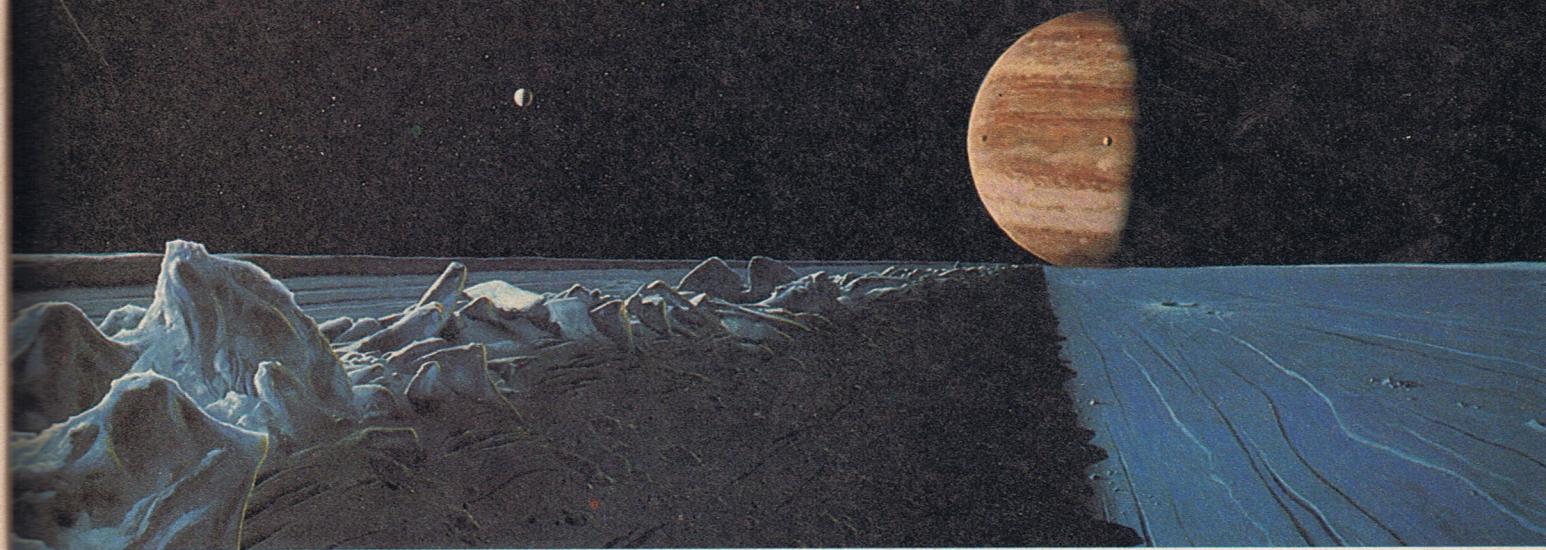
How does one go about planning a tour of places where, but for a very few exceptions, nobody's been before? First, Miller and Hartmann composed a list of exactly where they wanted their imaginary starship to take them. Of course, the nine known planets (there's a lot of talk going around of a tenth one) had to be included, as well as the major moons and other worldlets. They finally plotted their itinerary for 43 stops, broken down to four main categories, ar-

ranged according to size: The Giant Worlds (such as Saturn: The Lord of the Rings); The Major Worlds (like Earth: The Cradle); The Smaller Worlds (including Io: The Most Bizarre World); and Worldlets and Comets (with such oddities as 624 Hektor).

Once the format and route of the tour was agreed upon, the team got to work, trying always to keep in mind the intention of their labors. Hartmann addresses the *raison d'être* for the book in his introduction: "We want to shake loose our ways of thinking about the planets . . . see each world on its own terms . . . So we will travel through the solar system like early explorers of the West . . ."

Artist Miller refers to the more practical side of their efforts in describing their purpose. "Aside from money, of course," he says with his hearty laugh, "the book is intended for people who have never heard of a planet before—any planet. Most popular books assume that you know a bit about it in the first place; this one is written as if you didn't know anything about it. My experience from working at planetariums is that most people think planets are relatively small and kind of fuzzy. In reality they are worlds, at least as interesting as Earth. The whole idea is to make the solar system real, which is one of the reasons why we juxtaposed photos and paintings. This suddenly makes the painting *not* just an artist's conception—it's the real thing. A planet becomes something you can stand on and take a snapshot from."

Miller's planetarium work at the Air and Space Museum in Washington, D.C., has given him a tremendous knowledge of the solar system, and he



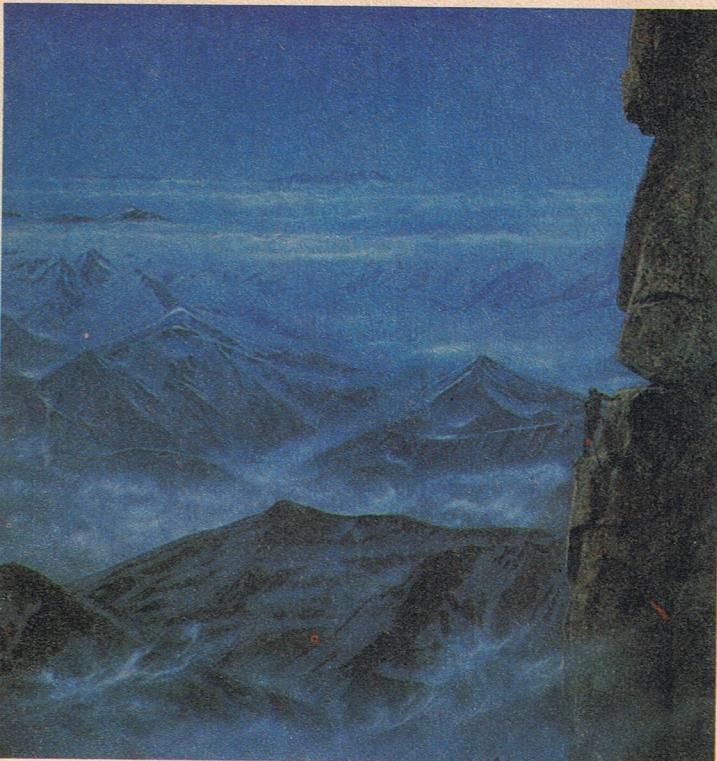
Europa, Ice Fracture

This is one of Ron's personal favorites from the book. Remarks the artist: "Europa is entirely covered with ice—probably clear through—a 1,000-mile ice cube. Internal shifting and tidal activity causes the crack in the ice. The material stacked up would be about 10 meters high. There's almost no relief [elevation]. Think of it this way: If Europa were the size of a billiard ball, it would be smoother."



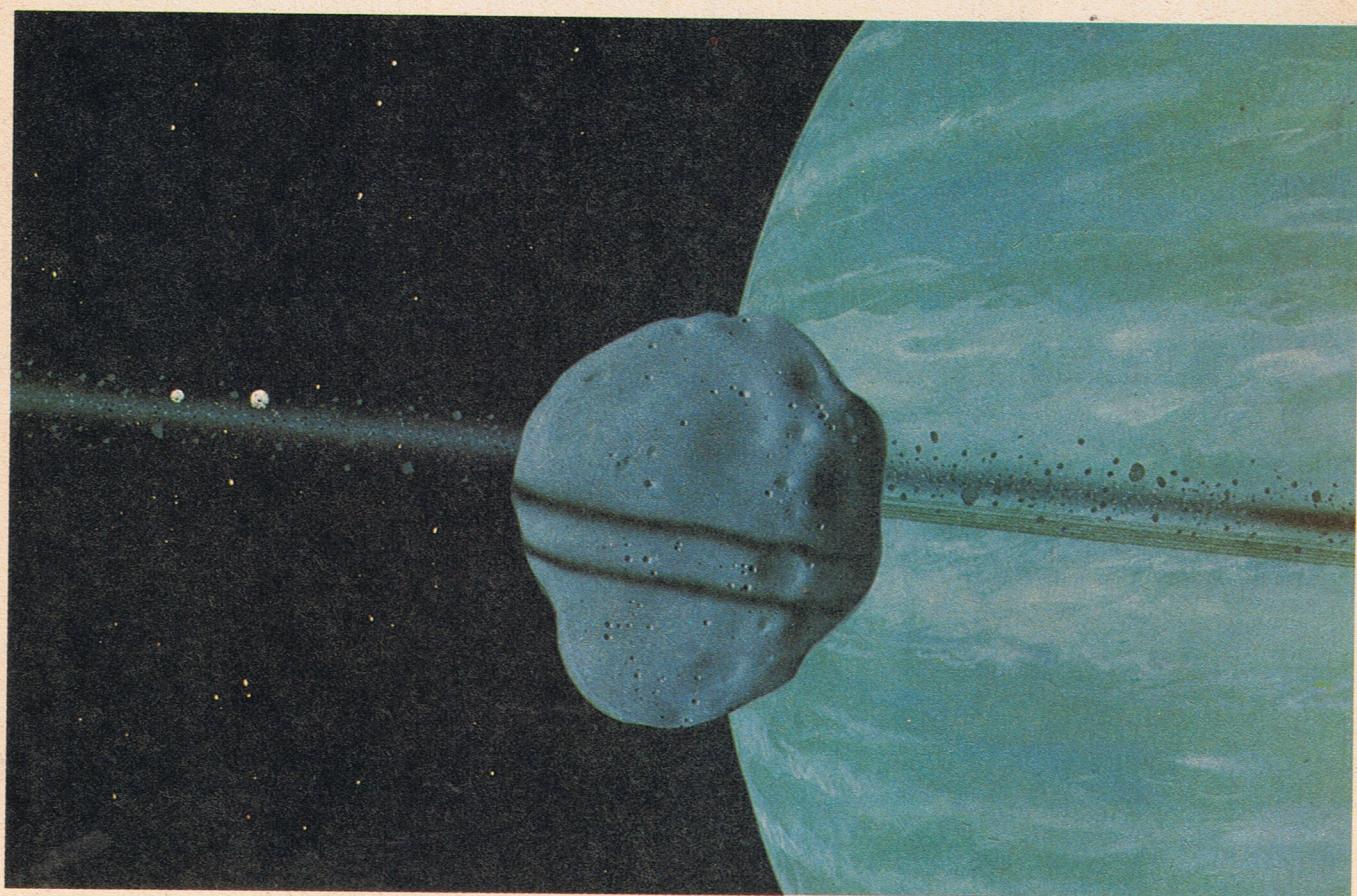
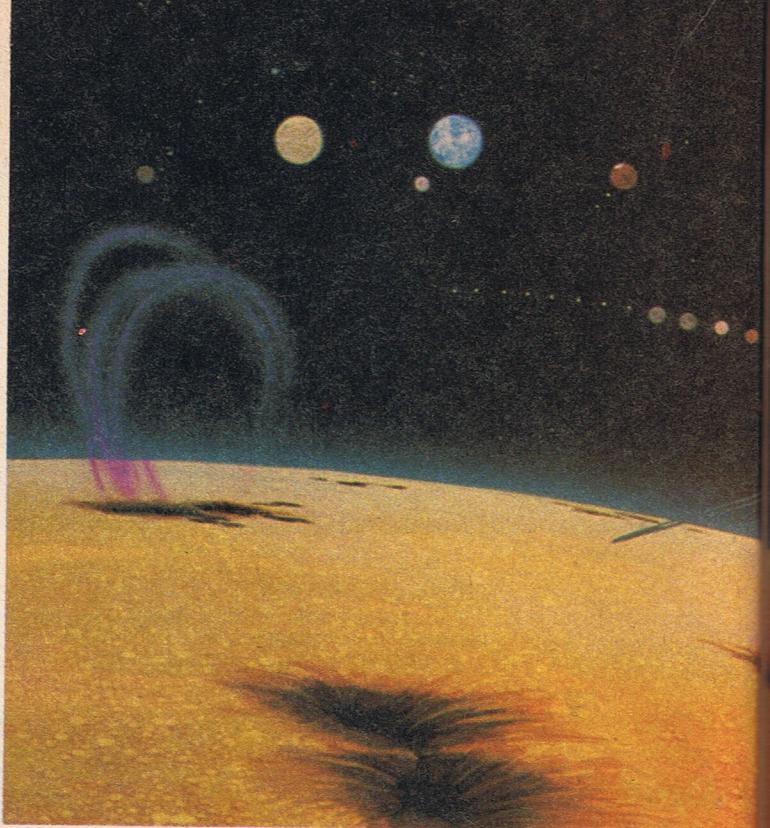
Electrical Storm on Venus

The *Bonestell* is hovering over the rim of an exploding volcanic caldera. The land around us has been bombarded by heat and acid rain. The lightning surrounding us gives the appearance of a fluorescent bulb going bad—a high-speed flicker. Lightning bolts flash at the rate of 25 bolts per second. The continuously roaring thunder is like standing under a waterfall—a constant rumble.



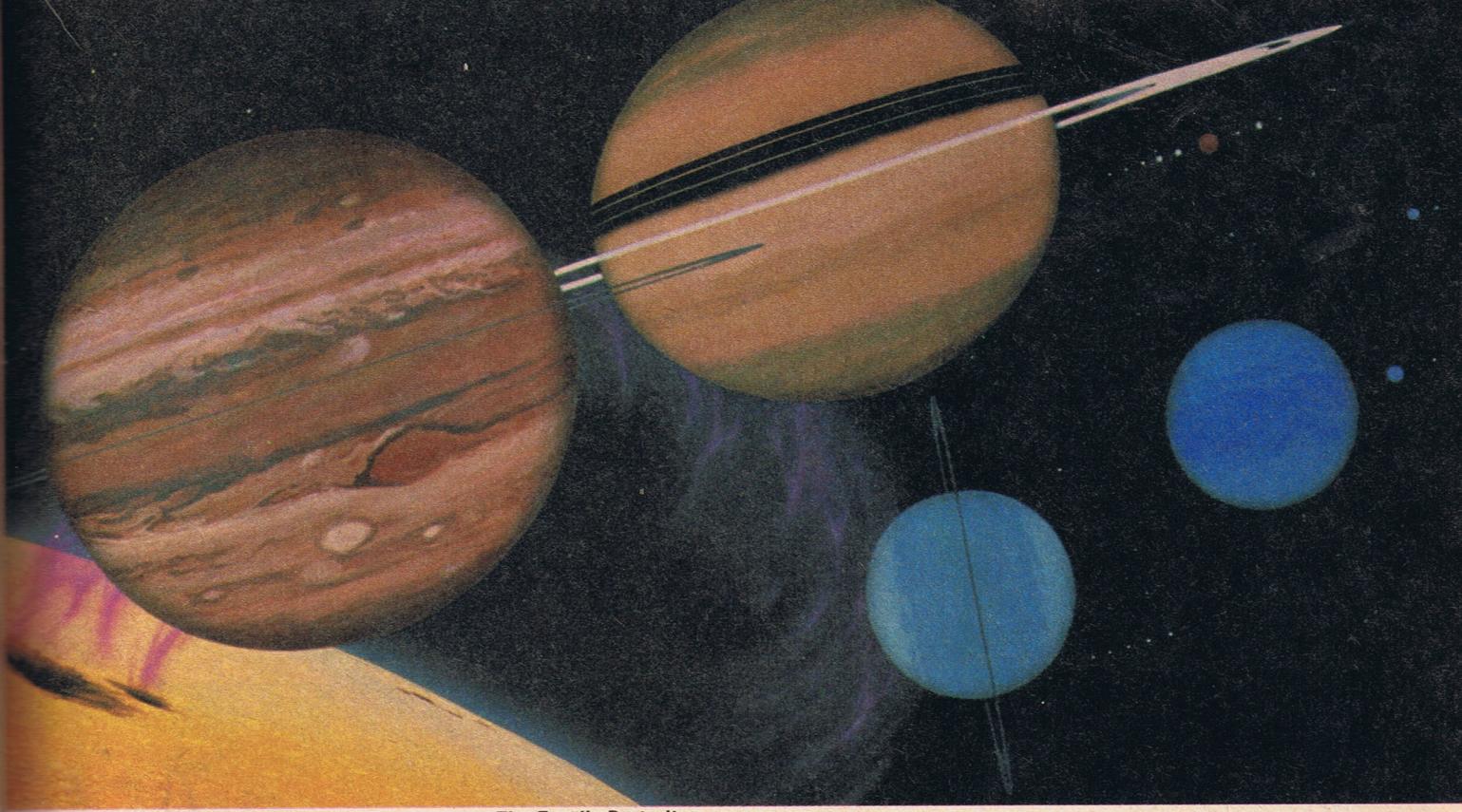
Terrestrial Mountains

Earth's mountains, formed by millions of years of the planet's shifting and environmental erosion, offer an almost otherworldly beauty in this view.



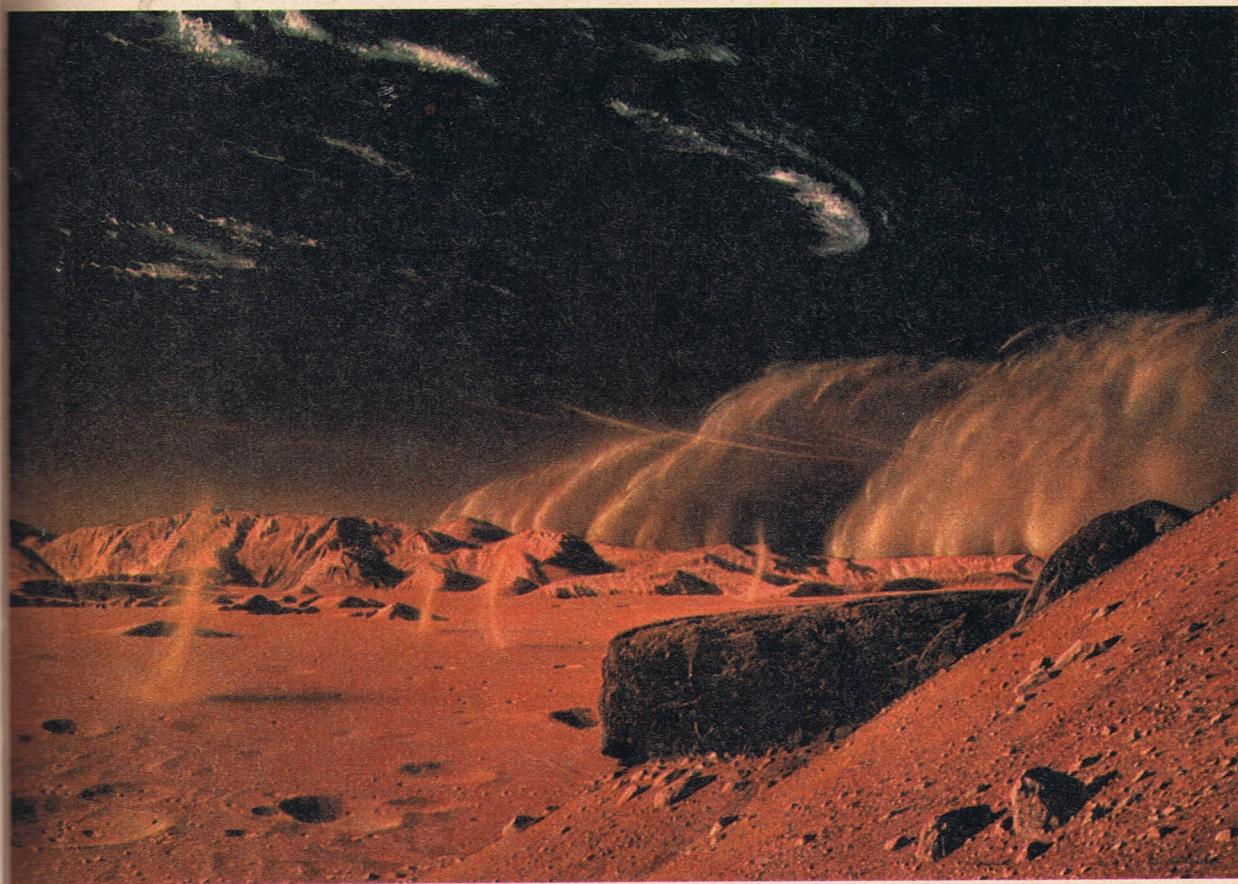
Inside Uranus' Rings

Uranus's rings, discovered only recently, are quite dissimilar to the brilliant rings of Saturn. Narrow, dark hoops, they are barely visible until you're just about on top of them. As the *Bonestell* nears this asteroid, the sun's light behind us casts a striped shadow from the rings in front of it. The ring material is composed of particles of dark rock and dust.



The Family Portrait

Here's Earth with all its (known) brothers and sisters—42 of them in total. Hartmann refers to our home as a pretty blue planet that could fit into one of the sun's whirlpool-like sunspots like a billiard ball in a pocket. He points to the two distinct groups of our solar system: the terrestrial planets — Mercury, Venus, Earth and Mars — and the gas giants—Jupiter, Saturn, Uranus and Neptune.



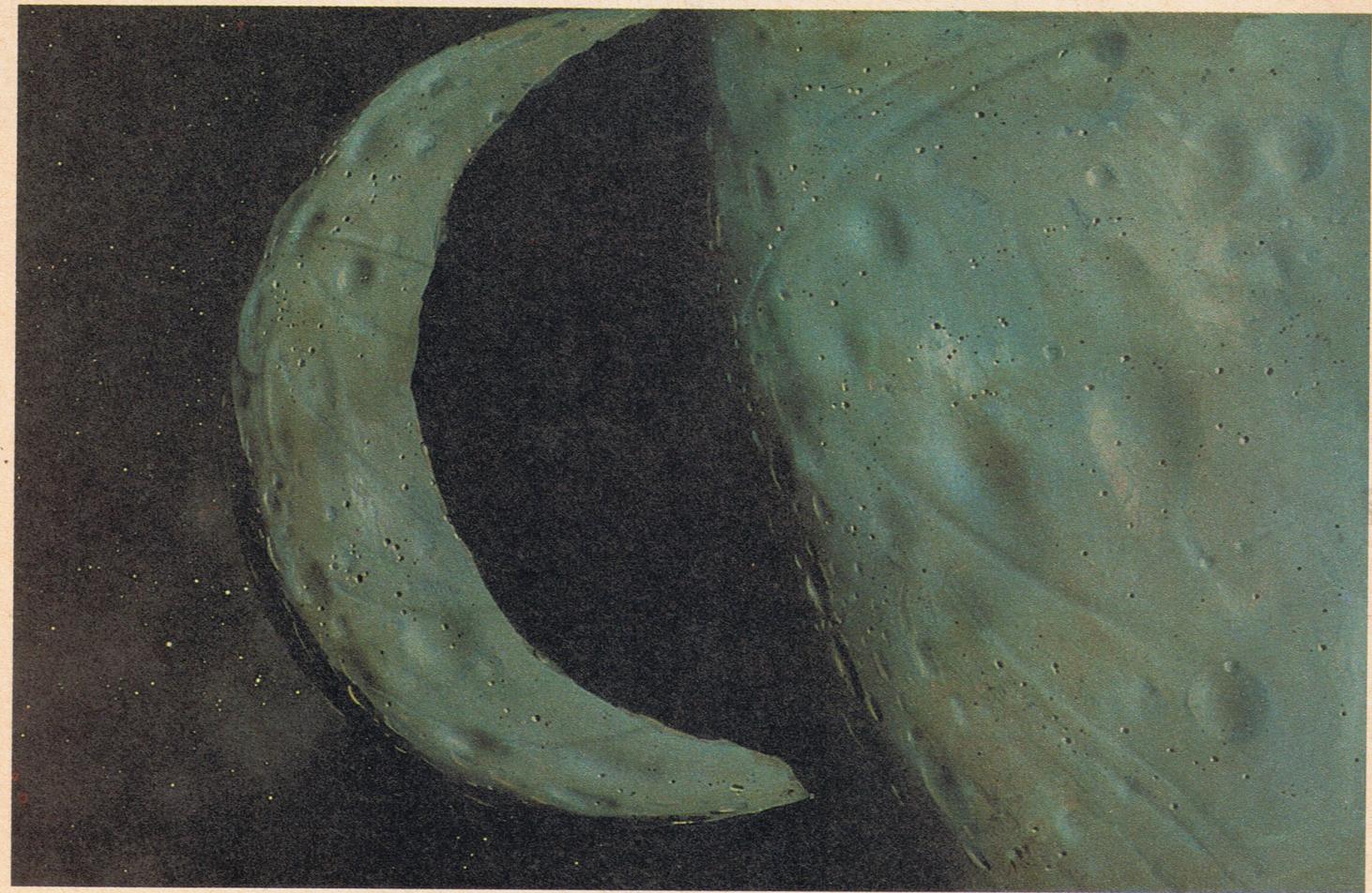
Dust Storm on Mars

The winds on this desolate planet whip up to the speed of sound. They swirl the thousands of miles of dust in violent storms that can last for weeks. The storm itself is approximately 50 miles deep, and will entirely bury the landscape. When the Mariner satellite first saw the planet, its vision was of a black rock in space, when it was actually a duststorm in action. These gyrating dust devils are the beginnings of the dust's blanketing journey.



Tycho

We are over a crater on Earth's moon. The crater, the result of a meteorite impact, is the size of Yellowstone National Park. Contrary to its ancient appearance, this rugged landscape is relatively young; older terrain is pocked by constant micrometeorite activity. Ron Miller describes Tycho as being "more Bonestellian than most places." The Milky Way is in the background.



Hektor

Miller calls Hektor the "flying peanut." Co-discovered by Hartmann and Dale Cruikshank in the mid-70s, Asteroid 624 Hektor, as it is officially designated, is 300 km long and highly elongated. It is actually a double object, and both planetettes are about the same size. Miller sees this celestial oddity as something of a playground. "If you walk around to the joint, you will just be standing there with this other world hanging over your head. You can jump from one to the other—from one planet to a new planet." In this view, we see two different views of Hektor, about an hour apart in its rotation.

"We want to shake loose our ways of thinking about
the planets... see each world on its own terms...
So we will travel through the solar system
like the early explorers of the West...."

and Hartmann sat together and drew up a profile of each stop on the tour. This led to discussions of how Miller might best represent the worlds with paintings, satellite photos, topological maps, etc., and in the most consistent manner. In the end, it meant that the artist had to lock himself away in his Virginia studio for nearly five months (from September '80 to January '81) to execute about 60 new paintings. When asked to reflect on the rigors of producing something approaching one painting a day, Miller says, "Wow...!"

Once all the astronomical renderings were complete (including ten by Hartmann), Hartmann came east to have a look. He critiqued each piece, mostly for its scientific accuracy, either okaying it or jotting notes on the back about what needed to be altered. Miller sighs with relief when he says that he's glad that he didn't have to completely redo any of the works. "As far as we know," he says, "everything in the book is 'correct,' but it really depends on who you ask. There are people who will faint when they see the book, and there are those who will say, 'Wow! It's great.' The more speculative the material is, the more people will probably disagree. But," he pauses for a moment, fingers his beard and grins, "what do *they* know." (The book is dedicated to Chesley Bonestell, one of Miller's major influences and heroes. When he called the elder artist to ask if he minded the book being dedicated to him, Bonestell asked, "Well, is it any good?" Therefore, Miller's dedication reads: "Without Chesley Bonestell (1887 - ∞) this work, in so many ways, would not have been possible and it is to him, with humble appreciation, that this book is dedicated. (Whether he likes it or not.)")

One of the most intriguing and alluring aspects of each visit to these alien bodies is that the traveler/reader is offered so much more than a pictorial glimpse. Together with an introduction and caption, the art, like those featured on the following pages, depicts an event

wherever possible. For instance, Miller's close-up of Terrestrial (Earth) Mountains (page 60) and the caption incorporate a real sense of what exactly Earth's mountains are: "As the Earth grew older, its crust buckled and wrinkled. Continental plates collided like sheets of ice in a frozen river. Where there was buckling, where plates met, where crust split and faulted, mountains were born."

Many of the events captured on these worlds are so impressive as to be almost unfathomable in comparison to what is experienced on our own planet. Like an electrical storm on Venus (page 59), portrayed as "...rolling billows of sulfur-laden clouds laced with lightning. It is an almost continuous display of electrical fireworks: 250 bolts *every second* lights us in a perpetually flickering glow while we're deafened by the continuous roll of thunder." Or a dust storm on Mars (page 61): "Like an avalanche of dust, a mountainous wall of dust—up to 50 km high... while winds shriek around us at nearly the speed of sound." Earthlings can only imagine what such harsh environments are like, and *The Grand Tour* supplies plenty of fuel for the imagination.

One of the more fanciful renderings in the book is the Family Portrait (pages 60-61), a shot of Earth and its celestial neighbors—42 of them in all. Besides its aesthetic qualities, one must appreciate that Miller has striven to keep all 43 objects in perfect symmetry; he's put himself in the driver's seat of the *Bonestell* as it streaks toward our solar system.

Considering all the time spent in painting his way through the solar system, did Miller find any place he would especially want to visit? "I used to think it was Titan [one of Saturn's moons], but then I've been to New Jersey," he says, alluding to the uninviting atmosphere found there by last year's Voyager I flyby. Pondering other objects of his celestial interest, he returns to Saturn, his undisputed favorite planet, and decides, "It would probably be Rhea, which has a pretty view of Saturn." □

(continued from page 57)

"Well, we are now about 120 years after Darwin, and knowledge of the fossil record has been greatly expanded...ironically, we have even fewer examples of evolutionary transition than we had in Darwin's time. By this I mean that some of the classic cases of Darwinian change in the fossil record, such as the evolution of the horse in North America, have had to be discarded or modified as a result of more detailed information."

Olshevsky is 100 percent wrong; the accumulation of evidence has made the classic case for evolution more a matter of faith, no less.

Unfortunately, Olshevsky is 100 percent correct in his statement that none of the scientists mentioned above is giving up his belief in evolution and adopting a creationist position. But that very fact puts me in an embarrassing position as a science teacher. I have to tell my students that, in spite of the repeated failures of evolutionary theory, most scientists are bent on forcing the evidence to fit some sort of evolutionary view—even Olshevsky's "punctualism," which Gould calls, "The Return of Hopeful Monsters," a view that is based on genetics that have never been observed and fossils that have never been found.

"Scientific creationists" like Dr. Gish, however, have been presenting, their case on the basis of known scientific principles and fossils that have been found. Olshevsky states that he has "never seen a statement of the 'theory' of creationism anywhere," yet there is actually an enormous amount of creation science literature written from elementary to graduate research level, much of it produced right here in San Diego at the internationally recognized Institute for Creation Research (which also houses a creation museum).

Olshevsky is rightly concerned about "the minds of children too young to distinguish truth from rubbish." It's certainly true that students with access to all the evidence regarding human origins, for example, might properly wonder which really is rubbish—evolution or creation. But training in "healthy skepticism" is foundational in true science education, and, open discussion on both sides of the evolution/creation question seems to be an excellent means to a worthy goal.

If evolution is supported better by the evidence than creation, then what do evolutionists have to fear from exploring both sides of the origins question? If creation is better supported, what does science have to lose by pursuing truth to whatever conclusion fits the facts the best? Isn't that what education in science is all about?

Dr. Gary E. Parker

Professor of Biology/Paleontology
Christian Heritage College

El Cajon

Seni Feb. 2, 1981 to the Tribune

Dear Sir:

Thank you for printing my long letter of

1/24/81 in VOP. Unfortunately, it had the side effect of spawning an almost equally lengthy response from the creationists, namely, the letter in VOP for 1/31/81 from Dr. Gary E. Parker, Professor of Biology and Paleontology at Christian Heritage College. He suggests that I have not kept up with the "cutting edge" of evolutionary theory, which is, of course, false. Contrary to his assertion that my points were "out of date" and "in error," the examples cited in my letter were well chosen and beautifully illustrate the fact of evolution. Many of the details can be found in George Gaylord Simpson's book, *The Meaning of Evolution* (revised edition, 1971), which is by no means as dated as Parker might have us believe. Stephen Jay Gould's magnum opus, *Ontogeny and Phylogeny* (Belknap Press, Harvard, 1977), develops a highly subtle and original description of the process which engenders new species from old. An excellent recent statement of the thesis of punctuated evolution is Steven M. Stanley's book, *Macroevolution: Pattern and Process* (Freeman, 1979). I suggest Parker return to these volumes to acquire a broader perspective of what evolution is all about. It evidently escaped him the first time around.

No paleobiologist in his right mind would ever point to a specific fossil and declare that it is the transitional form between two other specific fossils. Only an incredibly small fraction of all the prehistoric animals that have ever lived occur as fossils, and the odds against finding a complete sequence of transitional forms are inconceivably remote. It should be very clear to Parker that the term "transitional" involves generalization, and I am baffled by his seeming ignorance of this obvious point.

All scientists of evolution acknowledge that the fossil record is imperfect. This fact, being negative evidence, can never by itself invalidate the evolutionary hypothesis. It is, rather, the fact that practically every known fossil shares some morphologic characters with other forms that is of major significance to the theory of evolution.

In his discussion of hominids, Parker invokes hoaxes and errors—some of which, such as the Piltdown Man, might actually have been planted by creationists bent on muddying the waters—which are totally irrelevant as documentation of the hominid fossil record. Further, he seems unaware that Neanderthals were quite different from modern man (see "Neanderthal the Hunter," by Valerius Geist, in the January 1981 issue of *Natural History* magazine), and by his own admission acknowledges that australopithecines "remain as possible links to man." The sequence from the monkey-like *Aegyptopithecus* through *Ramapithecus* to *Australopithecus* to *Homo* documents a major trend recognized by virtually every scientist of hominid evolution.

The primary impact of the work of John Ostrom of Yale on *Archaeopteryx* stems from his documentation of over 20 morphologic characters that *Archaeopteryx* shares with dromaeosaurid dinosaurs, and not his

clearly labeled as hypothetical sequence illustrating his view of the evolution of flight. The most current summary of avian evolution is Alan Feduccia's *The Age of Birds* (Harvard University Press, 1980), in which is unambiguously documented the existence of a functional furcula and primary and secondary flight feathers in *Archaeopteryx*. We do not at this point care how feathers might have evolved from scales, nor how flight feathers and a furcula came to be in a fossil which is otherwise a typical small dinosaur. We do not at this point care whether *Archaeopteryx* is exactly one half bird and one half dinosaur, nor just where it occurs in the fossil record. The single solid inference provided by *Archaeopteryx*—glaringly obvious to any scientist but totally lost on Parker—is that birds and dinosaurs are closely related, because *Archaeopteryx* is indeed, as I asserted previously, a form perfectly transitional between the two groups.

Parker notes that "bones of typical birds have been found as far down in the geologic sequence as those of *Archaeopteryx*." Not yet, they haven't! Not one positively identifiable avian bone has been discovered in the Jurassic or earlier other than *Archaeopteryx*. I have made an extensive survey of the scientific literature in the course of my own work, and have determined that all known putative Jurassic avian fossils—which are extremely rare in any case—not accompanied by feather impressions cannot be reliably distinguished from small dinosaurs or pterosaurs.

Creationists demand that evolutionists supply them with evolutionary links to substantiate their theories. The evolutionists proceed to do so. The creationists then demand links between the links. On occasion, the evolutionists can still supply them. Then the creationists demand links between those links. Eventually, of course, fossil record peters out, at which time the creationists shout, "Aha! The links are still missing! Your theory is wrong!" This is the kind of garbage reasoning that is parroted by Parker when he cites David Raup—totally out of context, incidentally—in his letter.

What, then, do the creationists offer in place of evolution? Is there a coherent theory that can be subjected to scientific scrutiny and debate? How are species formed, if not by evolving from other species? How do creationists account for the systematic nature of the fossil record, or the fact that morphologic phylogenies closely resemble phylogenies developed by protein amino acid sequence analysis, or the observation that ontogeny seems to recapitulate phylogeny, or the remarkable fact that all the living things on Earth down to the level of bacteria use the same genetic code and the same genetic material, DNA? The theory of evolution, incomplete as it may yet be, provides detailed explanations that make sense. All that the creationists can say is simply, "That's all just some kind of coincidence," or, "That's the way God works, and we'll never understand God." Healthy skepticism is indeed the agent of scientific progress, but I am not so skeptical of the enormous body of evidence for evo-

lution that I would discard it in favor of the total chaos of creationism.

Thus, when I stated in my letter that I had never seen a statement of the "theory" of creation anywhere, I meant exactly that. I am well aware of the vast propaganda that passes for scientific literature, published by creationists and backed by fundamentalist religious sects trying to turn back the clock to the good old days when the Earth was the center of all creation and religious thought dominated Western culture. Let me quote from a book in my possession, written by the very Duane T. Gish quoted in the *Tribune* on 1/10/81, titled *Dinosaurs: Those Terrible Lizards*, published right here in San Diego by our own nest of creationists, and designed for sale to children for \$6.95:

"When did these animals become meat-eaters, if indeed they were meat-eaters as most scientists believe? Genesis 1:29-30 indicates that as originally created, man and all animals were to be plant-eaters only. We believe it is very likely that some animals, such as the dinosaurs, lions, tigers, etc., became meat-eaters after sin came into the world." (page 37)

Gish offers the following explanation of the function of the odd skulls of certain herbivorous dinosaurs: "No one has ever been able to figure out what these hollow bony structures were used for... Maybe this creature could mix some chemicals together similar to those used by the bombardier beetle, and store them in a storage chamber. Then when a meat-eating dinosaur like *Tyranno-*

saurus came after him, he could squirt a big charge into his combustion chamber (the hollow structure on top of his head?), add an anti-inhibitor at just the right time, and ZZZZZZZZZZZZ! Fire and smoke would come pouring out right in the face of the *Tyrannosaurus*." (page 55, accompanied by a color picture of *Parasaurolophus* blowing away *Tyrannosaurus* with his fiery breath, on pages 50-51)

Indeed! Lack of space prohibits quoting more of these creationist howlers.

Creationists accuse scientists of making up this fantasy of evolution and basing it on faith, not fact. Yet there is not a shred of evidence that sin and carnivores are in any way connected; not a shred of evidence that dinosaurs breathed fire. And why, if *Tyrannosaurus* and *Parasaurolophus* were both originally created as plant-eaters, would the herbivore have been given this fire-breathing apparatus to defend itself in the first place?

Yes, tragically, creationism has an extensive literature. So do astrology, occultism, parapsychology, flying saucers, pyramidology, scientology and any number of other bizarre human endeavors. Having an extensive literature is no guarantee against folly. Proper scientific debate of the merits of creationism has indeed taken place, but it was so short and swift that most of the creationists—including Dr. Gary E. Parker—missed it completely.

George Olshevsky
Member, Society of Vertebrate
Paleontology

Alternate Space

(continued from page 27)

the drive for accountability we have unleashed a monster that can destroy all new, innovative ideas... A new philosophic wave must be set forth. Exploitation of everything without guilt.

"The start will be the political arena. Target legislation: 1) Huge tax writeoffs for R&D; 2) Limits to liability; 3) Personal rights."

How can we get active on this political front? In the space arena, the—you guessed it—L-5 Society is tops. At no cost you can get signed up on L-5's political action phone tree. Send your name, address and phone number to Mark Hopkins, L-5 Society, 1620 N. Park, Tucson, AZ 85719. For \$20 you can also get the monthly *L-5 News*, a color publication covering the latest news on space political action.

If the dozens of people who wrote me on how to keep the spirit of progress moving are typical of FUTURE LIFE readers, anti-tech forces are outclassed both in numbers and brains. I predict that by 1985 we'll look back upon the grousing of the '70s-era Proxmires and Bossongs as a quaint and thankfully shortlived fad.

BACK ISSUES



#1—Backwinding Super-8 Film; Foreground Miniature Technique; Aerial Brace Construction.



#2—Spaceship Modelmaking; Blood Makeup; Smoke Generator; Light Beam Effects; Making an SF Logo.



#3—Robot Construction; Developing an Animation Style; Fluid Art Animation; Electronic Special Effects;



#4—Aerial Image Optical Printer; Construction; Wire Armatures; A-B Rolling; More Electronic Special Effects; Fog and Mist Effects.



#5—Aerial Image Optical Printer; Usage; Widescreen Super-8; Slit Scan Effects; Gleaming Eyes for Stop-Motion Models.



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Strange Adventures

Everyone Into the Pohl

A summary of Fred Pohl's career reads like a history of science fiction. He's been in the business of supplying SF's paper-and-ink junkies for four decades and in that time he's edited fanzines, most of the pulps (*Astonishing Stories*, *Galaxy* and *If* are only a partial list), some of SF's best anthologies, two of the genre's best book programs (Ace and Bantam) and still managed to write a host of terrific stories and novels.

Now, he's put together a retrospective collection, **Frederik Pohl's Favorite Stories** (\$16.95 in hardcover from Berkley/Putnam), that highlights his incredible career. If you're one of those readers who never notices editors, just writers, you may be surprised to discover how many of your favorite stories were presented by Mr. Pohl.

Fred's faves are a wide-ranging group of stories. They run from prime pulpy Heinlein to the scattered madness of R.A. Lafferty's best, from Larry Niven's staunch speculation to the stark and controversial DeLany *Dhalgren*. This collection even includes an excerpt from one of Pohl's mainstream discoveries, Gustav Hasford's *The Short-Timers*, a bitter but real bit of Vietnam come home to roost.

Here, Pohl shows himself to be a clever, tasteful editor who has steadfastly refused to pick a comfortable little niche and stay there. There's space adventure, close-up looks at absolutely alien cultures, more than a little prediction (Paul Ehrlich's "Eco-catastrophe" is an apt and on-target example), humor, twisted tales and more than a couple of stories that you'll go back to again and again. The prevailing rule here seems to be wit. None of these stories are just a good idea or simply an example of spectacular style with no story to tell—they all move well, use rich and varied language and seem to defy a few conventions.

Pohl has included classic Clarke, an excellent Sheckley story, Fritz Leiber, Silverberg, James Tiptree, Jack Vance and a dozen more (including one Pohl story), plus his own introductions and explanations that alone are worth the price of admission. Here Pohl remembers the pulps, the cheesy publishers, the awful mess of impending deadlines and editorial cafard without the rose-colored glasses that so often tint these backward looks.

This is a fine strong selection worth both your time and money, a fitting tribute to a brilliant career that isn't anywhere near over.

Last Knight

Damon Knight's *Orbit* anthologies haven't been around nearly as long as Mr. Pohl, but there has been a bit of history made there. In 1966, Knight started this iconoclastic anthology series and based it on the principle that there's no reason why science fiction cannot meet ordinary literary standards of originality, style, logic, coherence, sanity and even grammar—no reason that ideas must always overwhelm writing skills.

Knight has produced 21 volumes of excellent and original prose, but sadly, **Orbit 21** (\$12.95 in hardcover from Harper & Row) is the last in the series.

Orbit has always had a good mix of new writers and established pros. Among the authors who debuted in these pages are Gene Wolfe, James Sallis, Gardner Dozois, Vonda McIntyre and Joan Vinge. You could always count on Knight for a few surprises. *Orbit 21* is no exception. Only a few of the 13 authors featured are familiar names and the stories are all up to the standard of the series.

This book, though, has the same problems that may have put off readers in the past. Yes, the stories are excellently written, but they have a dry academic flavor and a dark pessimistic tone that smacks of too much seriousness. Now serious fiction can be wonderful, but when every one of the stories, from a time-travelling tale like Eileen Roy's "The Greening" to the usually joyous R.A. Lafferty's "The Only Song that He Could Play" ends in death, disaster, despair or all three, it could make you

hesitate before picking up the next volume of a series.



Knight closes strong here with stories from established pros Carol Emshwiller and Gordon Eklund and a superb group of new names—Richard Kearns, Raymond Embrack, Sydelle Shamah, Rhondi Villot and a half-dozen others. This series will be missed, both for the quality of the fiction and for the risks that the editor was willing to take. Perhaps the only good that can come of this is that Mr. Knight may spend more time on his own stories—there haven't been enough of them for a very long time.

Lizard Lore

Even with Damon Knight and a new generation of somewhat enlightened editors out there, there's still a lot of SF where a nifty idea manages to overwhelm the author's storytelling talents. In Nicholas Yermakov's first novel, **Journey from Flesh** (\$2.25 in paperback from Berkley), the author suffers just such a fate.

Yermakov starts off strong. His protagonist, Alan Dreyfus, a spacer on leave and looking for a good time, gets involved with a group of beautiful people and a derelict spacer with a lizard on his back. The lizard is an addiction, source of the derelict's exaltation and destruction. It enables him to get inside other people's heads, but it's costing him his life. Dreyfus sees the incredible, awful effect of the lizard, hears some uncomfortable truths about himself and the people he's come among and finally ends up with the lizard on his back.

This all happens in one sharp fast chapter. You're flying along, caught up in seeing the strange world of this port city, meeting this strange crew and this bizarre animal addiction and then you hit the rest of the book and everything slows down.

First, we find out why no one knows

anything about these lizards—they're from a quarantined world and they're secretly being used to create super-soldiers for the Shahin, a race living in uneasy truce with Terra. The Shahin know Dreyfus has a lizard on his back and so they're after him. Dreyfus is being protected by his BP buddies and looked for by his shipmates who, by now, know he's in trouble. Next comes the rescue by the shipmates and a run for the lizard planet. En route the shipmates



discover that dear old Dreyfus has eaten his lizard and become smarter, stronger, telepathic, and almost guruishly groovy. Sound familiar?

It should, because our nebbish has become a classic SF *übermensch* in the space opera mold, is being chased through the galaxy to a typically exotic clime by the usual sort of nasties and he does have a properly exotic female companion tucked under his arm.

Yermakov has started off with a startling image—a man with a lizard on his back—and managed to slide into the predictable action-packed conventions that genre authors depend on so often. It almost seems that once he had established his strong opening image, Yermakov stopped thinking and started playing safe, stayed inside the limits.

One can only hope that on his next excursion, Yermakov can go two chapters before the reflexes take over—if not the whole distance. I, for one, hope he makes it all the way.

Perilous Playland

There are a lot of ways to hurt a story other than letting an idea run away with you. One of the easier methods is to pick a storytelling gimmick and lose the story to that. In *Magic Time* (\$2.25 in paperback from Berkley), Kit Reed breaks her story down into a lot of discrete units, then uses a different character's point of view in each of them. In less skillful hands, this linguistic lockstep could destroy any sort of storytelling rhythm, but Ms. Reed manages to make this tale

stand up and dance.

Magic Time is the story of a Disney land-type pleasure dome gone adult and deadly. If you can imagine it, it will be provided for you for a price—anything from fighting Indians to rescuing damsels in distress and all complete with real corpses.

We're taken through this wonderland by Boone Castle, a young holographer who just wants to leave; Evaline, a 70-year-old who's had everything hoisted back into place and is looking for something to do before age and gravity wins again; Luce, a tough young woman who wants Boone badly enough to throw a monkey wrench into everything; and Kaa Jaaji, the Indian (eastern variety) who paid for this adventure. And what fun he's having!

This wonderland is Happy Habitat, a place where dreams come true and a nightmare is being hatched. You see, there's a single sinister mind behind the scenes here that doesn't like the world beyond the walls of happyland, so it's planning on wiping everything and everybody out. And our four accidental adventurers are the only things in his way.

Their perils range from the ridiculous to the remarkable as they are menaced by Chinese dragons, storytelling rabbits and camera-toting rodents. And all their perils are televised for the amusement of the guests.

This is a well-told mini-epic that has a lot in common with Philip K. Dick's best efforts. There is the same feeling that the most innocuous objects or people may be the greatest threat, and that there's always going to be someone or something out to get you.

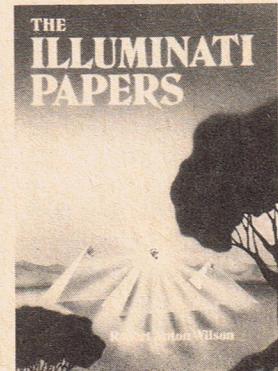
Ms. Reed has been doing good things with too little notice for all too long. This remarkable story of paranoia in paradise should garner her at least a little of the acclaim that she deserves.

A Paranoid's Progress

Robert Anton Wilson uses a unique

technique to put together his books. He calls it guerilla ontology. In this approach to explaining the way the world works, he mixes the elements of past, present, future and fiction so completely that the reader must decide on every page (and sometimes every other paragraph) how much is real and how much is put-on. To him, this makes considerable sense because by the time his books see print, anything he wrote that was true is probably obsolete and all the fantastic stuff already will seem conservative.

Wilson's latest paen to strangeness is *The Illuminati Papers* (\$7.95 in trade paperback from And/Or Press). If you missed his earlier *Illuminati Trilogy* or his latest Illuminati offerings from Pocket Books, don't worry. No prior



experience is necessary to the understanding of this book. Even if you'd read all of them you would still get confused—also absolutely fascinated.

The Illuminati Papers contains secrets of evolution, methods for eliminating stupidity, a guide to your nervous system, ten reasons to get out of bed in the morning and Wilson's usual array of lunatics, conspirators and freaks.

It's hard to call this collection of oddities a book. It collects essays by a whole range of celebrities: Haggard Celine, the celebrated submariner; Epicene Wildeblood, America's most celebrated literary critic; Simon Moon, the anarchist who hasn't had an unhallucinated day since 1968 and more—but they're all characters in Wilson's fiction, aren't they?

Well, characters or not, the Illuminati position papers and interoffice memos, the pop quiz, the Raymond Chandler haiku, and the Wilson interviews comprise a worthy entertainment with touches of enlightenment even if it doesn't satisfy some purists' definition of what it takes to make a book.

If you have it in mind to take a closer look into the future, *The Illuminati Papers* is a pretty good place to start. □

Dr. Frankenstein Meets the Woolly Mammoth

When I first heard that a group of American and Soviet scientists was trying to clone a woolly mammoth, extinct for thousands of years, from frozen remains found in Siberia, I could only wonder—why? What if they could isolate some living cells from the thawed carcass of a baby mammoth that had been laying frozen for at least 40,000 years? Would they, in Frankenstein fashion, construct a laboratory-bred creature and haul it out for various symposiums? Or how about a King Kong-esque extravaganza at Radio City Music Hall? I was reminded of Admiral Bird's famous "because it's there" line, translated to "because we can."

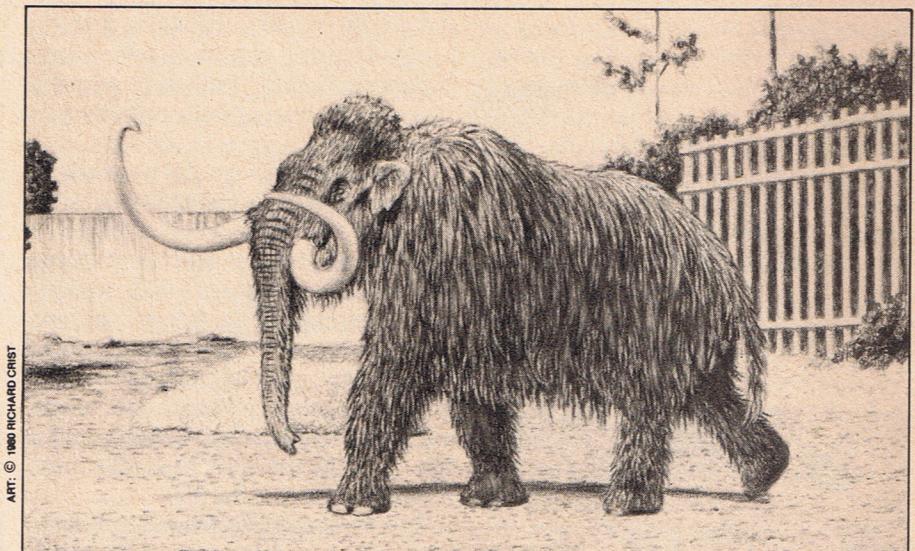
And then I spoke with Dr. Morris Goodman, a professor of anatomy at Wayne State University, near Detroit, who's among those trying to clone a mammoth. Or so I thought.

"The woolly mammoth calf (*Mammuthus primigenius*) discovered in the Magadan district of Siberia has provided a unique opportunity for historical and biochemical studies of an extinct mammal." This passage comes from an extremely technical report by Goodman *et.al.*, and it pretty much sums up the entire project. In other words, tissue from Dima, the name given to the baby mammoth exhumed in Siberia in 1977, has the potential to provide some terribly useful information to aid in the study of the molecular evolution of the elephant. Aside from that, there are some juicy speculations, the stuff that makes for great copy.

The most exciting of the speculations is the chance to, as Goodman said in an interview, "...clone mammoth genes, and ultimately produce a creature that is part mammoth and part [modern-day] elephant."

Was this simply some hi-tech hyperbole from a wild-eyed scientist who'd just seen *Altered States*? Goodman, a respected researcher who made history for showing that humans are actually closer genetically to chimps and gorillas than to Asian apes, explained in layman's terms what exactly is going on out there at Wayne State.

Back in '77, Goodman and one of his students read newspaper accounts of the discovery of mammoth remains in



ART: © 1980 RICHARD CHRIST

Siberia. The student, obviously struck by the possibilities of such a find, remarked in empirical terms, "We ought to get our hands on some of that tissue." Which is precisely what they did. Following a series of communications to the Soviet scientists that made the discovery, and some other diplomatic efforts, they were sent an unusual package. "In August '78 we got a small piece of Dima tissue, and [Marion Barnhart] found red and white blood cells and skeletal tissue remaining, and lots of collagen," Goodman recalls. But this, it seems, was not enough for Goodman, who confesses, "You get addicted to it after a while. I needed more tissue."

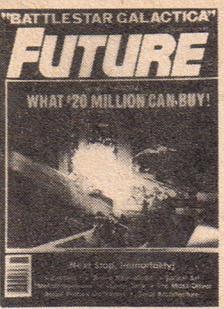
Goodman and his team got their "fix" last August with the arrival of a parcel containing two kilograms of air-dried muscle from a 53,000-year-old adult male mammoth and a 10,000-year-old female sub-adult, as well as an additional 25 grams of frozen muscle from Dima.

The scientists had not, as was initially reported in the press, found any intact, living cells from which, as the sensationalist scenario goes, they could "clone a woolly mammoth." Rather, Dr. Paul Johnson, a Wayne State associate professor of biochemistry, did find DNA in all three specimens, a factor that *does* have sensational implications. If it can be proven, in this case through electron microscopy, that the DNA is in fact that of the mammoth, it would be entirely feasible to isolate that DNA and

hybridize it with that of a living elephant. If it happens that there is enough similar information in the two sets of DNA, it is then time to return to Goodman's words about "ultimately producing a creature that is part mammoth and part elephant." But first they must identify the DNA.

Because of the unique freezing and thawing conditions in the region where the mammoths were interred, the tissue found has been remarkably well-preserved; kind of a natural form of cryonics. Many scientists scoffed at the idea of finding even DNA in the tissue—much less any intact cells—but there it is. Now they must prove that it's not merely DNA from a parasite or other organism that was in the same bog, either 40,000 years ago when the mammoth died there or that came along sometime during the interim. After all, 40,000 years is a long time.

But the question still remains: why? Morris Goodman the scientist answered that the research could help in understanding how DNA stands the rigors of time, that it could help in the comparison of modern elephant and mammoth biochemical genetics, and could enable a study of the environmental conditions that led to the mammoth's one-time success and later its extinction. Then Morris Goodman the curious speculator delved into the future possibilities. "Maybe in a hundred years from now science will advance to a point where we can completely duplicate the woolly mammoth." ■



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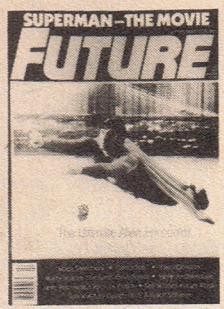
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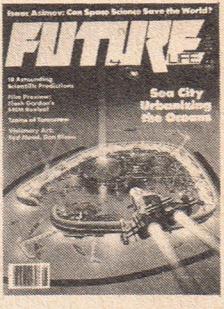
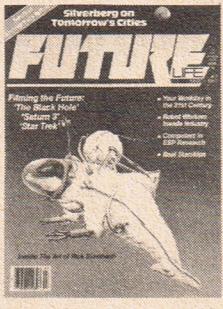
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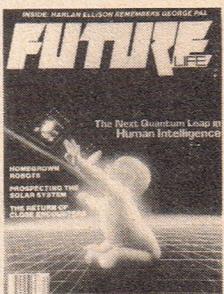
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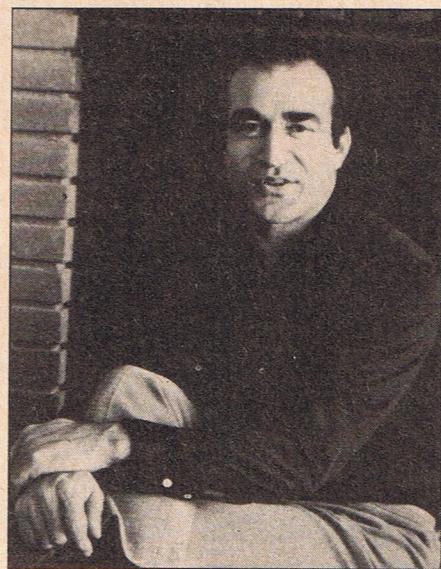
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Energy Alternatives
Tomorrow: Timothy Leary



FM. Esfandiary is a telecommunicator—writer—long-range planner—university lecturer. He has taught Up-Wing philosophy since the mid-1960s—first at the New School for Social Research (New York) and currently at UCLA (Extension). His most recent books are *Optimism One—Up-Wingers—Telespheres*.

Esfandiary says: "I am universal. I translive all over the planet. Learn via telecom. Have many professions. Am involved with many people. Consider all children as mine also. Neither right nor left—I am Up. I have no age. Am born and reborn every day. I intend to live forever. Barring an accident I probably will. I also want to help others live on indefinitely. My philosophy: optimism—abundance—universalism—immortality."

Up-Wing Priorities

Around 2010 the world will be at a new orbit in history. We will translive all over this planet and the solar sphere—at home everywhere. We will be hyperfluid: skim on land—swim in the deep oceans—flash across the sky.

Family will have given way to Universal life. People will linkup/linkout free of kinship and possessiveness.

We will stream ahead propelled by a cornucopia of abundance.

Life expectancy will be indefinite. Disease and disability will nonexistent. Death will be rare and accidental—but not permanent. We will continuously jettison our obsolescence and grow younger.

At 2000 plus ten all this will be the norm—hardly considered marvelous.

But why wait for 2010? A new ideological thrust—a new set of priorities can help accelerate our upflow.

All the old guidelines are now off target. Capitalism and socialism for example are burned out industrial-age constructs. They have helped propel us to this time zone. But they have no scenarios for higher orbits. At best they want to realign existing social systems.

The Right/Left has no program to screen out aging and death. No grand designs for our new civilizations across the solar system. Right/Left planners are still committed to the "industrialization of space"—orbital communities

with three-story houses—eight-to-five jobs—schools—farms—Italian restaurants! Is this why we want to trailblaze across the universe?

Throughout the 20th century the world has veered Left. In the coming years we will wing beyond Right and Left. We will move Up.

Up is a triumphant new trajectory—a coalescence of all the Big Bang breakthroughs of our times.

The following Up-Wing priorities are interdependent—to advance rapidly in any one area we must leap ahead in all areas.

These priorities are accelerators—targeted to speed up our forward thrust to the first or second decade of the next century. By 2010 we will have splashed through so many Time shifts that we will need entirely new accelerators.

Physical Immortality: The most basic and urgent problem facing us is death. All other human constraints are derivative. Death casts a pall over all of life. So long as we are terminal we cannot enhance the *basic* quality of life. So long as there is death no one is free.

Accelerators: Slow down aging through genetic/cellular intervention. Telemonitor every person for continuous protection from internal and external hazards. Reformat our terminal bodies into versatile telebodies with easy plug in replacement parts. Facilitate freely to reduce gravitational wear and

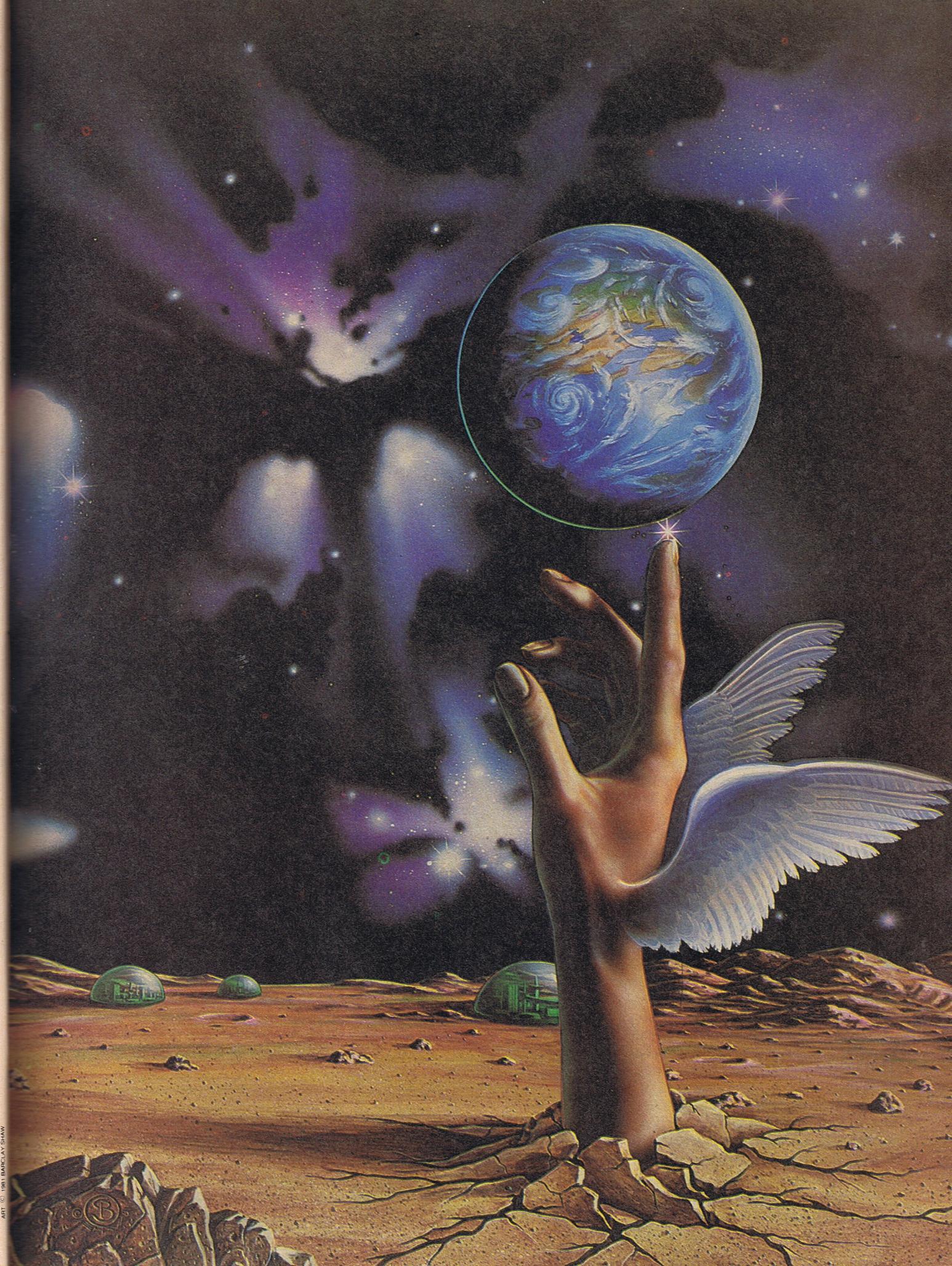
tear and rapidly break away from natural disasters. Provide universal cryonic suspension in case of unavoidable death. Spread a Psychology of Immortality—the will to live forever.

Space Colonization: We must urgently accelerate colonization and exploration of the solar system and the universe beyond. Why is this a top priority? Because such a trajectory opens up a Pandora's Box of infinite space—*infinite* energy—*infinite* raw materials—*infinite* growth. Quicken transition beyond industrialism. Accelerates evolution from Earth-programmed animal/humans to post humans. Multiplies chances for interconnect with other intelligences which could instantly lightspeed us ahead a million years.

During these trans-century decades orbital societies offer excellent opportunities for clean rapid break from Earth conditions which for millenniums have perpetuated human suffering. Under no circumstances should we replicate Earth-like societies: no exclusive procreation or parenting—no families schools hospitals or prisons—no money economies or subsistence work—no slaughter of animals for food—no leadership governments—no nations—no cemeteries. Orbital civilizations should start off with 21st-century telespheres.

Telespheres: Let us speedup the orbit shift from industrialism to the new age. The world of telespheres is flowing from the confluence of breakthroughs in many areas: limitless energy—interactive telecommunication—ultra intelligent machines—biological and cultural revolutions—space colonization. These and other forces are recontexting life in fundamentally new ways. We are creating electronic environments that integrate all peoples and services. No one need remain waterholed near stationary centralized sources of learning livelihood or decision making. You connect from wherever you are. For example the track beyond school is teleducation which facilitates transmission of continuous updated info to anyone anywhere anytime. Beyond hospital—preventive telemedicine. Beyond bureaucracy—telemanagement and teleconference. Beyond vindictive judicial systems—preventive crime telemonitor. Beyond profit retailing—direct teleshopping from production decenters. Beyond leadership government—teledemocracy via universal referendums....

Telebrain: How do we fastforward the human brain? Continued mapping



of more and more of the brain. Implanted slow-release drugs to self-regulate moods and biochemical shifts. Genetic engineering to regenerate aging brain cells—upgrade intelligence—deactivate vestigial parts of brain.

Plug in/plug off super microchip implants to amplify brain versatility and power. For example: millisecond computations in the head with visual displays—instant access to info—hi-speed playback—simultaneous info retrieval/transmission. Implanted transceiver for direct brain to brain interface. Implanted sensors for continuous monitoring of all body functions and self-regulation of biorhythms and mood swings. By 2010 the human brain should emerge as a super telebrain—a powerful autonomous transceiver free of the animal body—able to connect with new replaceable bodies.

Universal Life: We need to hasten the transition to universal telegensis universal parenting universal life. Mating is no longer necessary to perpetuate the species. We can now reproduce through insemination—inovaluation—telegensis—in vitro births—in vitro cloning. As mating loses biological function family—marriage—coupling phase out. Humanity is decoupling. In our rapidly converging worlds we need to grow fluid and universal—able to connect with more and more people without getting blackholed in exclusive commitments.

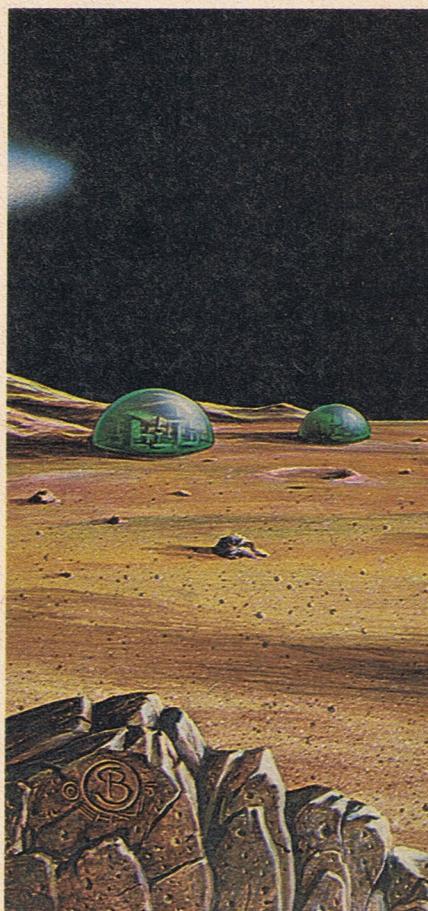
Accelerators: Fertilize only those screened sex cells most likely to spawn healthy wholesome new lives. (Later we will mix most desirable elements of many people's cells.) Identities of those whose sex cells are selected for reproduction are never disclosed. Therefore the newborn belong to no specific parents. They lift off in mobilias—with many trans parents. Shared parenthood eases burdens on parents and reduces the child's early programming to lifelong painful traumas of imprinting and possessiveness.

As coupling phases out people flow within a global network of linkups. By 2010 exclusivity will have phased out. Whose child are you? Whose parents? Whose sister or brother? Who are you involved with? All these will be flashbacks from our tribal past. People will connect openly freely universally.

Teleconomics: To stream full blast to 21st-century teleconomics we must speedup development of solar ener-

gy—nuclear fusion—hydrogen fuel. Energy is the central accelerator. Abundant energy means overflow food and limitless raw materials. The new wealth—particularly solar energy—is nonmonopolizable and will reinforce global decentralization of wealth—information—power. The new abundance also accelerates development of intelligent technology which will cancel out subsistence

"We want to spread a new awareness that from here on we are resigned to nothing—consider no human problems irreversible—no goals unattainable."



work and labor force. Work will be transformed into a voluntary creative process. By 2010 the glut of energy will hasten phase out of money which in turn will help phase out profit and competition—imbalances in wealth—conflicts of interest—cycles of inflation/recession—exploitation. How absurd all this emphasis on finite resources and sacrifice at the very moment in evolution when we are opening up the infinite resources of the universe. We have superabundant resources to last us a million years—a billion years. Enough to last for as long as there is a Universe.

Teledemocracy: All forms of leadership are intrinsically authoritarian—the differences are in degrees. Voting for leaders and representatives (who then make unilateral decisions for the people) is not democracy. Let us stop deluding ourselves. In our times democracy means *direct* participation in all decision making. This means voting not for leaders—but voting directly on issues.

Accelerators: Every week every month—or as often as necessary—people deploy their transceivers to vote directly on issues. All sides of every issue are regularly telecast. Computer flashforwards of probable consequences of each scenario are simultaneously aired. (Because there are no struggles for leadership issues are depoliticized. The focus is on merits of each plan.) Temporary committees (picked at random every month) supervise the referendums and the implementation of decisions. In the age of two-way interactive telespheres leaders and representatives are as superfluous as scribes. By the first decade of the new century government will exist mainly in name as power will shift to the people via direct consensing.

Telecommunities: Industrial age cities have a great future—as museums. We should close them down and clear out. What will replace cities? We have some early forerunners of 21st century telecommunities: mobile communities—airparks—global festivals—global festivals—global video events—space colonies.

A telecommunity can be instant—activated in days dismantled in hours. These new communities accommodate the increasing mobility of people—they are in effect liftoff/landing platforms. They are also fluid and modular—no stones bricks or concrete—nothing that will stay long enough to atrophy into

tenements and ghettos. Abundant solar energy means that these linkup spheres can be set up anywhere. Deploy only automated vehicles and any modules that fly. Streets are obsolete. The new communities are completely tele-sphered: teleducation—telemedicine—teleshopping etc. The size is nonissue—they continuously expand contract transform as people flow in and out. Telecommunities coalesce the new variables and can act as momentum swings to 21st-century life.

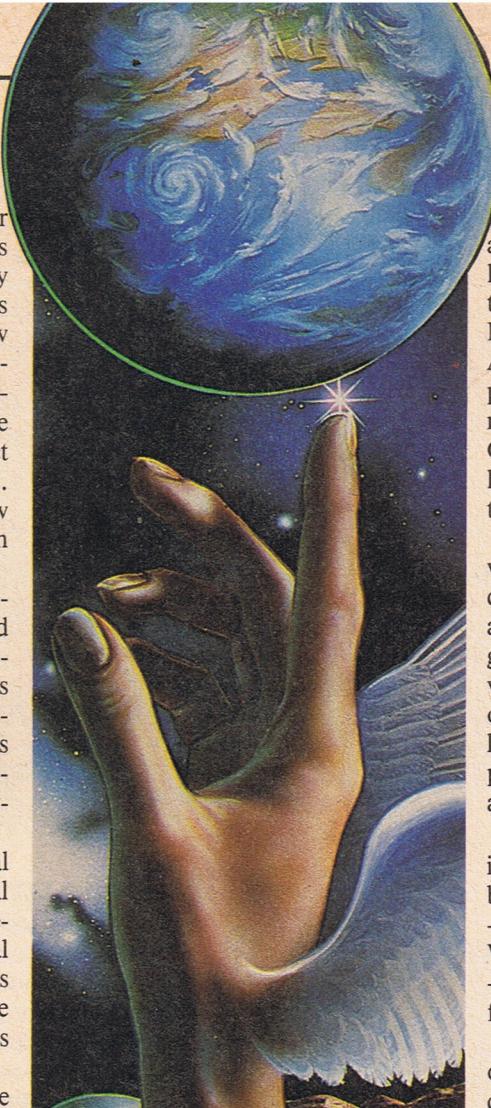
Globalism: In the age of global telecommunication—supersonics and world travel—global economy—nations exist mostly in name. In our times nationalism is a sure sign of backwardness. Nations are like peeing territories charted by dogs. Such territoriality is antifuture—you should be able to pee anywhere in the world.

Accelerators: More and more global infrastructures to accommodate global issues. Global referendums—global telecom networks and publications—global exchange programs—common markets and regional blocs—universal language (Unilang)—anything that will bring us together.

How can you the individual reinforce this process? For one thing publicly disavow nationality. What is your nationality? I am global. But where are you from? I am from planet Earth. Such a stand can help spread the new consciousness. Live global: Each time you travel you make the world a little more intimate. The earlier children translive around the world the better the chances they will emerge as world people and globalize the rest. There are no more tourists or foreigners no internal affairs or national honor. This whole planet now belongs to all of us.

21st Century Values: Traditional values have issued from eons of scarcity—hardship—brief lifespans—insularity. Late 20th-century breakthroughs are formatting new environments which spawn new values and ideals. A 21st-century consciousness is surfacing increasingly free of Puritan guilt—shame—cynicism—self-denial.

What does the oldworld psychology of sacrifice mean in the new age of abundance? Entire generations are coming on line who have never known poverty and hardship—for whom abundance and comfort are the norm. The new consciousness views hardship as stunt-



"How absurd all this emphasis on finite resources and sacrifice at the very moment when we are opening up the infinite resources of the universe."

ing—wealth as liberating.

What does age-old orientation to suffering mean at a time when medical breakthroughs are screening out physical and mental pain?

What does the work ethic mean in the age of intelligent technology which is taking over more and more of our work? The work ethic now slows down growth. The new Leisure ethic accelerates innovation and progress.

What does competitiveness mean in an age of plenty? Why do we need to know who is best at anything? Why contests? Why winners and losers? Why the Nobel prize the Pulitzer prize the Academy Awards? Systems that pit people against one another are oldworld and manipulative and must be boycotted. Competition saps everyone's energy. To hyperspeed ahead we need complementation of everyone's creativity.

What do religions and spiritualisms which demand child-like submission to deities and "higher authorities" mean at a time when vigorous new generations growing up in permissive open environments accept no authorities as final or absolute? At a time when our cosmic leaps are daily proving that there are no permanent constraints—that we are free agents in the Universe?

The greatest breakthrough of our age is unfolding in our self image. A new brand of revolutionary is fast emerging—fired up by entirely new dreams. Up-Wingers are not content with civil rights—equal rights—human rights. These freedoms are no longer enough.

We now want to design all areas of our evolution. We want biological freedoms. We want the freedom to spread out across the Universe. We want each one of us to be alive a hundred years from now—a thousand years—a million—forever.

We want to spread a daring new optimism crystallizing from the obvious fact that for the first time in all the eons of life we are no longer blackholed within this microplanet—no longer trapped within fragile terminal bodies—that we are emerging as a triumphant new species—extraterrestrial and immortal.

We want to spread a new optimism and self-confidence stemming from the glaring fact that we who launch probes into interstellar reaches—we who flash signals to other beings across the Milky Way—we who decode light streaming in from the outbarks of the Universe over ten billion light-years away—can surely now mobilize our genius to accomplish anything.

We want to spread a new awareness that from here on we are resigned to nothing—consider no human problems irreversible—no goals unattainable.

We want to spread the awareness that we are at lift off to a beautiful new age. There is a new Hope in the world.

© 1981 Up-Wing Priorities. F.M. Esfandiary

(continued from page 36)

fer hardships, but Japan, Britain and the others would collapse.

How do you see the world's energy future—tomorrow, the day after and the day after that, say, along about 2080?

Professor Cesare Marchetti of the International Institute for Applied Systems Analysis has found that the way energy sources have succeeded each other over the past 100 years very precisely follows a remarkable mathematical formula he has developed. If you consult this "oracle," you find that, in the future, the source that will displace all the others—except perhaps natural gas—is nuclear fission, with nuclear peaking about 2016 and being replaced by something as yet unknown.

Even without consulting mathematical formulas, you can see this coming, for there simply isn't anything else, except in supplementary roles. Happily for me, this is also the way I would like things to go.

If you look at things politically and not technologically, what you can see in the works is a powerplay by the Soviet Union for the energy and mineral sources of the world. Just look at a world map and read the news. The United States is today in mortal danger, close to losing out to the Soviets.

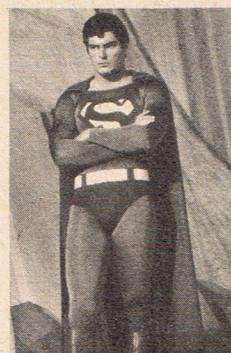
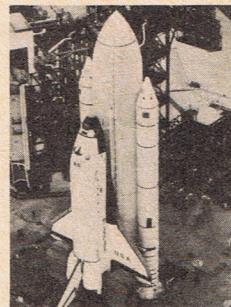
It looks to me like we are in for a replay of the 1930s. Then people thought they could get away with appeasement, and they didn't want to think the unthinkable—until they had lived the unlivable. That is the way the world is going, unless people wake up.

What advice do you have for our readers who are concerned about our energy future?

I think they need do no more than learn how to look for the truth and then seek it. This means studying science, technology, economics and political science based on the only things that count: evidence and experience. It means learning how to tell the demagogues from the genuine scientists.

How can one tell? Well, let me make a little propaganda for my new booklet, *The Radiation Bogey* [\$2 from Golem Press, Box 1342, Boulder, CO 80306]. It gives four criteria that can help: the test of trustworthy authority; the test of the alternative; the test for weasels; and the test for consistency. In the booklet, I explain these and how to apply them. □

next issue



SPACE SHUTTLE

Hopefully, by the time you read this, the maiden voyage of the space shuttle *Columbia* will be history. At the time of this writing, we are waiting patiently for an official announcement on exactly when the orbiter is scheduled for liftoff. **FUTURE LIFE** will be there, both at the Kennedy Space Center for blastoff, and the landing site in California. Along with our on-the-scene report and exclusive color photos, NASA's Jesco von Puttkamer has prepared a general overview of the entire program.

'SUPERMAN II'

You'll believe a man can fly again as Christopher Reeve, Gene Hackman and others return to the big-screen in the long-awaited, star-spangled sequel to the adventures of the Man of Steel. Already garnering rave reviews from overseas audiences, *Superman II* boasts even more fantastic flying effects and a bold storyline that culminates with the ultimate alien's fateful battle with the Phantom Zone villains. Our resident movie mogul Ed Naha interviews the film's principals, and we'll have plenty of exciting color photos.

EMORTALITY

The human quest for eternal youth is gaining momentum, as science continues to explore the avenues toward immortality. Dr. Alvin Silverstein, a leader in the effort, has coined the word "emortality" to describe the modern search for eternal life. Author Peter Christiansen reviews the emortalist underground that is currently promoting life-extension research. His report includes a useful directory of the growing number of emortalist organizations across the country.

SUMMERTREK II

With summer nearly upon us, vacation plans are in the making. In our second inspection of what's happening around the nation, **FUTURE LIFE** offers the latest tips on museums, planetariums, exhibits and other points of interest to the future-minded. Our directory includes such enticing stops as the Alabama Space and Rocket Center, Corning Glass Center, Disney World, Kennedy Space Center, the National Air and Space Museum and the International Space Hall of Fame.

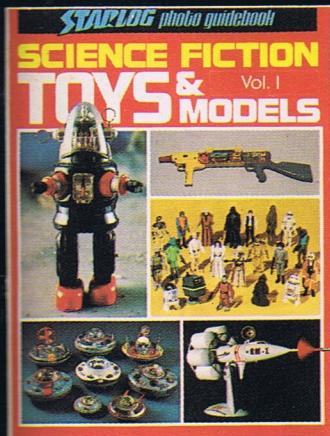
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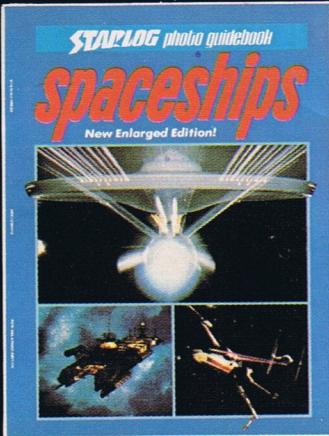
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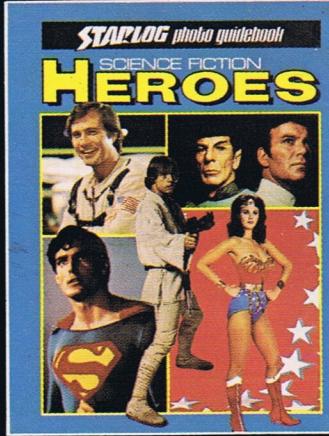
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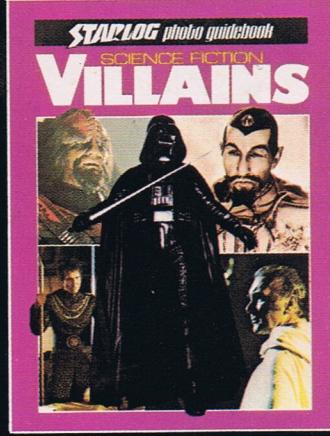
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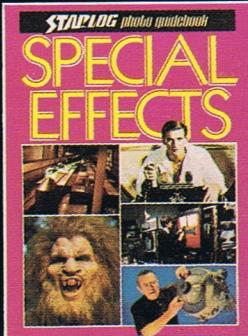


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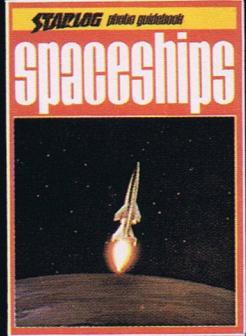
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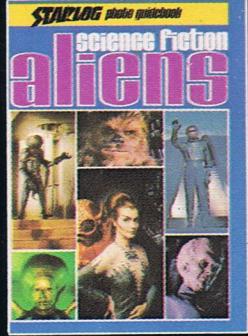
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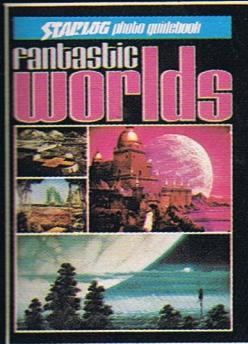
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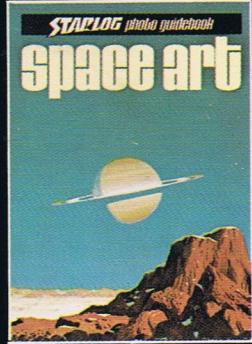
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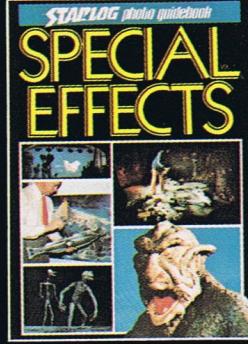
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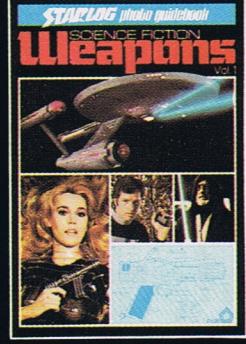
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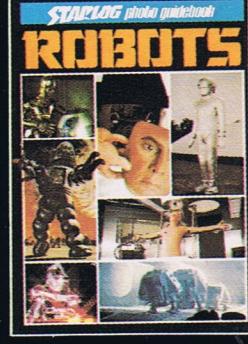
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